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# CONTENTS

MARCH 2022 | VOL. 35 ISSUE 2

## DEPARTMENTS

- 2 **INSIDE HFM //**  
The ABCs of PDC.
- 4 **ADVOCACY ADVISER //**  
The importance of acceptance testing.
- 5 **MY ASHE MESSENGER //**  
Questions and answers on stairwell codes and rooftop healing garden classifications.
- 6 **DESIGN DISCOVERIES //**  
How health care design supports staff focus.
- 7 **ARCHITECTURE SHOWCASE //** Riley Hospital for Children at Indiana University Health Maternity and Newborn Tower welcomes new lives in Indianapolis.
- 8 **UPFRONT //**
  - New frameworks help to redefine health care violence prevention.
  - Youth interns with disabilities get fresh opportunities.
  - PPE monitors help reduce transmission.
  - New Penn Med Pavilion achieves LEED certification.
- PLUS**
  - **ASHE Tools** Getting front-line staff involved in the design process.
  - **Checklist** Codes+standards
  - **ASHE and AHE Insights** New programs and resources to help members.
- 12 **INTERVIEW //** Kelly Guzman, president of the Nursing Institute for Healthcare Design, talks about her organization and its plans for the future.
- 14 **SOLUTIONS //**
  - PRODUCTS** "On Our Radar," Nurse Communication and Fire Safety.
  - FIELD REPORT** Sanitizers integrated into IPC program.
- 51 **ADVERTISER INDEX //**
- 52 **HFM ONLINE //** Topics that are trending on our website.

## FEATURES

- 20 **COVER STORY**  
**Annual Hospital Construction Survey**  
Maintenance staff input leads to long-term benefits.  
ARTICLE BY **BETH BURMAHL**  
AND DATA BY **JAMIE MORGAN**
- 28 **SPECIAL REPORT**  
**PDC Summit preview**  
A look at the International Summit & Exhibition on Health Facility Planning, Design & Construction.
- 30 **INFRASTRUCTURE**  
**Oxygen concentrator relieves med-gas issue**  
Hawaiian hospital finds solution for pandemics and other emergencies.  
BY **TONY MOISO**
- 36 **DESIGN**  
**Opportunities for hospital sustainability**  
Three areas for improving design and operations.  
BY **DALE A. ANDERSON** AND **DARREN M. SCHWEND**
- 40 **MARKETPLACE**  
**Health care furnishings to meet any challenge**  
Capabilities continue to grow while new applications multiply.  
BY **NEAL LORENZI**
- 44 **COMPLIANCE+OPERATIONS**  
**Building hospitals in the pandemic era**  
Lessons in flexibility and technology learned during COVID-19.  
BY **JEREMY BECHTOLD** AND **MARK CHRISMAN**
- 48 **ENVIRONMENTAL SERVICES**  
**Playing a key role in project planning**  
The EVS leader's crucial function in hospital design and construction.  
BY **KIMBERLY MILLER**

ON THE COVER // Image by Getty Images



# The ABCs of PDC



**Shadie (Shay) R. Rankhorn Jr.**  
SASHE, CHFM, CHC,  
ASHE President

**A**s we wrap up the first quarter of 2022, we continue to work hard 24 hours a day, seven days a week to ensure our communities have access to functional and safe health care facilities. And, to continuously strengthen the work we do, we must honestly analyze previous decisions, actions and outcomes to determine what went well, what didn't go well and what potentially could go wrong.

Communicating openly about both successes and failures enables effective future decision-making, ensuring we are prepared for the next significant global event. For example, the pandemic is revealing the importance of flexibility in the health care physical environment — granting facilities the capacity to adapt to constantly evolving technology and patient care models, and to patient surges from pandemics and other disasters.

To achieve this, we must address these needs at the outset of planning, design and construction by ensuring facilities managers, environmental services professionals, infection preventionists, clinicians and others are at the table. Early representation from all the health care team members who work in a facility leads to facilities that work for every team member, which improves patient care.

It is imperative to encourage debate, innovation and unified progress with colleagues and business partners. The International Summit & Exhibition on Health Facility Planning, Design & Construction (PDC Summit) in March is an opportunity to do that. My presidential platform highlighted the importance of education and training and recruiting qualified staff. At the PDC Summit, American Society for Health Care Engineering (ASHE) members and partners meet safely for education, collaboration and community.

For me, the PDC Summit is a time when I not only see new products and meet new vendors in person, but I learn about new codes, design ideas and team approaches to planning, design and construction. It is there I have met folks who have helped me be more successful on projects by providing best practices, being a part of my project team or coming to work with me.

ASHE's focus on PDC will continue. Keep an eye out for new resources, and I look forward to seeing you at the PDC Summit!



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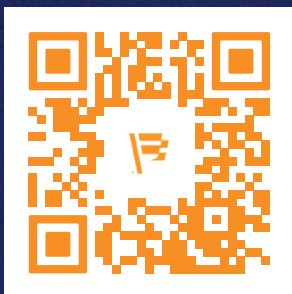
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## ADVOCACY ADVISER

### The importance of acceptance testing

An acceptance test is performed on an individual piece of equipment or system to verify compliance with design documents and that the installation is in accordance with applicable codes. It can be performed on a completed system or at various stages during the construction process.

Fire protection and life safety system acceptance testing is important because it is potentially the last operational test of the system before a fire event requires it to operate as designed. These systems only operate during a fire event, so there is no warning that they are not functioning properly unless it is identified during an acceptance test or routine inspection, testing and maintenance.

Some life safety features such as fire doors and fire

dampers require acceptance testing

to be performed by a qualified person with knowledge and understanding of the operating components in the type of assembly being tested.



**Lennon Peake**  
PE, SASHE, director at  
Koffel Compliance

It is critical to perform required acceptance testing and properly document results to ensure a compliant baseline is established for future tests and comparisons, such as for a fire pump field acceptance test, which must verify the performance of the

pump is equal to the performance indicated on the manufacturer's certified shop test curve. It is recommended – and sometimes required by code – to retain all acceptance testing documentation for the life of the assembly.

Acceptance testing should not be confused with commissioning, which ensures a building system or systems are functioning according to the intended design criteria set forth in the project documents and satisfy the owner's operational needs, including compliance with governing laws, regulations, codes and standards. For example, a smoke evacuation system in an atrium requires commissioning only after acceptance testing is performed on all the individual systems such as dampers, door openers, fire alarm relays and air-handling units.

The National Fire Protection Association's NFPA 3, Standard for Commissioning of Fire Protection and Life Safety Systems, and NFPA 4, Standard for Integrated Fire Protection and Life Safety System Testing, contain the requirements for commissioning and integrated testing of fire protection and life safety systems. **HFM**



**QUESTION: In an "I" occupancy, are waterless foam hand cleaner dispensers allowed to be in an exit stairway? Where would I find this information in the code?**

The 2012 edition of the National Fire Protection Association's NFPA 101®, Life Safety Code®, 7.1.3.2.3, states that an exit enclosure shall not be used for any purpose that has the potential to interfere with its use as an exit and, if so designated, as an area of refuge. Therefore, essentially, anything that does not support or serve the stairwell should not be in a stairwell, which includes hand cleaner dispensers.

**QUESTION: Does anybody out there have a rooftop healing garden? If so, what is the classified occupancy? Is it assembly, health care or other?**

Generally, these areas are classified as an assembly use for the purposes of calculating occupant load and applying

means of egress requirements. Applying the concepts found in 6.1.1.4 of the Life Safety Code for multiple mixed occupancies will help clarify the area. Under the International Building Code (assuming it is the basis for the state building code), you will want to look at section 508.3 for nonseparated occupancies. These requirements are very similar to those in the Life Safety Code, just worded a bit differently. In both cases, the most restrictive requirements of all the occupancies involved (usually health care and assembly) are to be applied. **HFM**



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ASHE members can go to [my.ashe.org](http://my.ashe.org) to ask or answer questions from colleagues. If we choose your question or answer for this column, we'll send you some ASHE swag as a token of our appreciation for contributing to the My ASHE online community.

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# How health care design supports staff focus

**W**e often talk about interruptions and distractions in health care, especially when we think about medication errors, but both issues are part of the larger condition of workflow disruption. Research shows that distraction, miscommunication and delayed treatment, all components of disrupted workflow, can lead to adverse events including medical errors and even death. The Center for Health Design's Knowledge Repository includes dozens of citations for studies focused on how health care design can reduce the likelihood of disruption. Three are highlighted here.

Disruption to the provision of care can be especially dangerous during an emergency. A study by Mihandoust and colleagues looks at the issue of disruption in the ambulance.



**Melissa Piatkowski**  
research associate,  
The Center for Health  
Design

The research team used simulated telemedicine-based stroke consults in moving ambulances to evaluate the link between the ambulance environment and disruption. They found several hazards that

lead to disruptions in the care process, in particular seat size and arrangement, and the location of equipment. It appears that the left ambulance seat zone and head of the patient bed were the most problematic areas for environment-related disruptions. Findings reveal a need to rethink the design of these spaces.

Another recent study looks at end-of-shift handoffs between physicians in emergency departments (EDs). Joshi and colleagues were interested in understanding how workstation design in the ED

## Research used for this column

**T**he following citations from The Center for Health Design's Knowledge Repository of health care design resources were used by the author when writing this column:

- S. Mihandoust et al., "Comparing Sources of Disruptions to Telemedicine-Enabled Stroke Care in an Ambulance," *HERD: Health Environments Research & Design Journal*, 2021.
- R. Joshi et al., "Emergency Physicians' Workstation Design: An Observational Study of Interruptions and Perception of Collaboration during Shift-End Handoffs," *HERD: Health Environments Research & Design Journal* 14, no. 4 (2021): 174–93.
- E.P. Larsen, "Optimizing Radiology Reading Room Design: The Eudaimonia Radiology Machine," *Journal of the American College of Radiology* 18, no. 1 Pt A (2021): 108–20.

impacts collaboration during this handoff process. Through observation and a survey of physicians, the researchers compared open workstations to semi-open and enclosed workstations.

As expected, physicians in the open workstations were interrupted most often, for both clinical and nonclinical reasons. They found that very few physicians

felt they experienced frequent interruptions in the enclosed workstation pods, and that the pods seemed to facilitate a sense of collaboration with other colleagues in the workstation during handoff. Interestingly, while there were fewer interruptions in the semi-open workstation compared to the open workstation, the percentage of physicians who perceived frequent inter-

rptions in the semi-open workstation was like that of the open workstation.

While disruption in emergency settings has obvious safety implications, the negative consequences of disruption in other

clinical spaces may not be as straightforward. However, disruption in the radiology reading room can have significant effects, such as misdiagnoses.

A case study by Larsen and colleagues examines the effectiveness of a carefully designed sequence of different radiologist workspaces broken down according to varying levels of interaction ranging from

more collaborative to more independent reading space requiring quiet, disruption-free focus.

This study addresses the stress related to disruption to workflow as part of a larger focus on physician well-being and burnout. Based on findings from a survey and focus groups, the research team developed a floor plan layout that they speculate would optimize distraction-free

space for deep reading while preserving separate space for the more collaborative functions involved in radiology. Further research is needed to see how well the design functions in the real world. **HFM**

### ABOUT THIS COLUMN

"Design Discoveries" highlights research from The Center for Health Design's Knowledge Repository, a user-friendly library of health care design resources. This research effort is supported by the American Society for Health Care Engineering, the American Institute of Architects, the Academy of Architecture for Health Foundation and the Facility Guidelines Institute. It can be accessed at [www.healthdesign.org/knowledge-repository](http://www.healthdesign.org/knowledge-repository).



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## Hospital welcomes new lives

**T**he newly renovated Riley Hospital for Children at Indiana University (IU) Health Maternity and Newborn Tower centralizes all inpatient childbirth and newborn care offered at three IU Health hospitals. Riley's tower houses the largest number of neonatal intensive care unit (NICU) beds in Indiana and among the largest number in the country.

Families who have previously visited the Riley Hospital for Children facility might not recognize the health care provider's newly renovated tower. BSA LifeStructures spearheaded design of the five-story tower as the campus continued operating 24/7 to serve patients and families. BSA partnered with construction firm Messer Construction on the building, which opened in November 2021.

When visitors enter the first floor lobby, they are surrounded by bright, naturally lit and modernized spaces; public and private waiting areas; open spaces; and a grand view of the original front façade of Riley Hospital for Children that adorns one wall of the atrium.

Two round, all-glass elevators greet visitors, inviting them to see all the way up the building. Updating the atrium meant bringing it up to code in all aspects, including the addition of a complex smoke evacuation system of 202,800 cubic feet per minute designed to meet requirements without sacrificing the grand feel of the space.

Floors two through five of the original structure were demolished and fully renovated — along with partial demolition of the first floor — to re-imagine purposeful design leading to optimal function and beauty of the spaces.

The second floor — the largest floorplate of all five stories — includes a 10-room obstetric emergency department, and a labor and delivery unit with 16 rooms, three of which are designated as obstetrics intensive care unit rooms to serve more critical patients prior to their deliveries. A small surgery suite is also located on this floor, consisting of four operating rooms (ORs), one of which is for fetal surgery. BSA's design also includes an infant resuscitation room with a window connected to the ORs so critical babies can be passed to the neonatal surgical team nearby.

The second floor also includes 14 patient rooms for high-risk antepartum patients who need to remain on bed rest prior to delivering their babies.

The third floor is comprised of 45 private, Level 3 NICU rooms, some of which accommodate siblings from multiple births. A Ronald McDonald House family space is designed to provide a place for family members to rest, relax and refresh.

Floors four and five have been renovated to house a 38-bed postpartum unit. Each patient unit within the newly renovated tower is equipped with a private toilet and shower room, warming cabinet for baby, space for families, a headwall for mom's treatment, and a baby and nurse area. The fourth floor of the facility also includes three patient rooms for babies born with neonatal abstinence syndrome. **HFM**

### ARCHITECTURE SHOWCASE

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University Health  
Maternity and  
Newborn Tower

**LOCATION //**  
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BSA LifeStructures

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SECURITY

## New frameworks help to redefine health care violence prevention

**T**he health care field is determined to take action on workplace violence challenges through better tools to strengthen a proactive approach to violence prevention and de-escalating potential risks earlier.

Among those tools are The Joint Commission's (TJC) new and revised workplace violence prevention standards for accredited hospitals and critical access hospitals, which took effect Jan. 1, and a guide from the American Hospital Association (AHA) in partnership with the International Association for Healthcare Security and Safety (IAHSS) on mitigating workplace violence, which can be accessed at [aha.org/workplace-violence](https://aha.org/workplace-violence). Each aims to provide a framework to support hospitals in developing effective workplace violence prevention systems.

Before examining the framework, however, Robyn Begley, DNP, R.N., NEA-BC, FAAN, CEO of the American Organization for Nursing Leadership and chief nursing officer and senior vice president of workforce for AHA, advises that health care leaders must redefine workplace violence.

"In the past, when we thought about workplace violence, it was physical violence in nature, but that definition has really been expanded," she says. "It goes from incivility on one end of the spectrum to those things we think of as incidents of mass violence, like shootings, on the other end."

Adopting a broader definition of violence encourages health care professionals to reduce their tolerance for disrespectful treatment and de-escalate situations earlier, before they become dangerous. However, Constance Packard, CHPA, senior director and chief public safety at Boston Medical Center and IAHSS president-elect, notes that pandemic-induced staffing shortages have made critical face-to-face de-escalation training a challenge.

"[It] can be an issue with their schedules," she says. "But we work our best on giving them the tools they will need to be proactive and not only reactive."



Members of the Boston Medical Center security team during IAHSS Public Safety Week.

Brendan Riley, CHPA, director of security for parking and transportation at Lahey Hospital & Medical Center and IAHSS workplace violence prevention subject matter expert, sees this challenge playing out across health care.

"Competing priorities have made it difficult for health care organizations to focus on workplace violence prevention with any consistency, even while experiencing a significant uptick in incivility, aggression and even assaults," he says.

That's where Riley sees TJC's new elements of performance (EP) as a valuable framework for helping organizations reorganize violence prevention efforts. However, Riley predicts that most health care organizations will need to revise their workplace violence prevention programs to ensure compliance with the new EPs.

"Much of the training and education that has been in place does not cover all four areas of focus outlined in [TJC's] Standard HR.01.05.03, EP 29," he says. "Additionally, an annual worksite analysis specific to workplace violence prevention is a new process for many organizations. Many organizations identify risks through this process already but have not necessarily tracked the resulting mitigation

strategies and changes to policies, procedures, training and education, and updates to the existing environmental design that result from the worksite analysis findings."

Riley and Packard offer several tips to help health care safety teams begin to audit their workplace violence programs to ensure TJC compliance, including:

- Ensure a comprehensive workplace violence prevention policy is in place and up to date.
- Designate an individual leader for the workplace violence prevention committee, in compliance with TJC Standard LD.03.01.01.
- Reevaluate the committee's multidisciplinary team to ensure all key stakeholders are represented, with a blend of leadership and staff to include evening, night and weekend shift representation.
- Have executive-level sponsorship of the program, with any program updates communicated to the entire workforce by the CEO.

In taking a bigger stance on violence prevention, these experts also encourage health care professionals to think more broadly about violence beyond their walls. // BY MEGAN HEADLEY



## OPERATIONS

## Youth interns with disabilities get fresh opportunities

**W**est Virginia University (WVU) Medicine's J.W. Ruby Memorial Hospital in Morgantown, W. Va., recently introduced its second cohort of youth interns with disabilities participating in Project SEARCH, an international transition initiative that since 2010 has involved over 30,000 young adults who engage in a nine-month unpaid internship training program.

The program's goal is to immerse these interns in various workplaces, including health care environments, to improve their employability and marketable work skills. To reach that goal, the program provides real-life work experience combined with training in employability and independent-living skills to help young people with disabilities make successful transitions to productive adult lives.

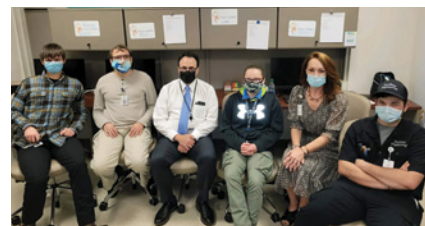
"It's significant that the second cohort of interns has been welcomed at Ruby

Memorial Hospital during a pandemic," says Nick Lafferty, Project SEARCH instructor for volunteer services at WVU Medicine. "The first class of interns graduated from the program during the beginning of the pandemic, and three of the five original interns are now current employees of WVU Medicine.

"Being that we are the only Project SEARCH-participating organization in West Virginia, hosting a second year, despite significant obstacles, is nothing short of a miracle," adds Lafferty. "The support and passion for the program, shared by those at the national level and by stakeholders here at the hospital, made it possible to continue the mission for year two and beyond."

Currently, the hospital is working with five Project SEARCH interns, including one who was selected to train with the facilities department.

"This intern was able to experience all of the teams within Ruby Memorial's facilities department," Lafferty says. "He did everything from rounding, where he checked equipment and services to ensure they were functioning properly, to carrying out basic repairs, painting and repairing drywall. He learned how to use a walkie-talkie, a work tablet and the tools necessary to complete his task."



Pictured, from left: Justin Micheal (intern), Ben Chicchi (intern), Richard Pellegrino (COO), Jules Heldreth (intern), Colleen Sybert (VP of human resources) and Garritt Neel (intern).

Lafferty says other health care organizations can learn from WVU Medicine's embrace of Project SEARCH and commitment to its interns.

"These interns can add value not only to the work they accomplish while learning, but to the community at large," he says. "This program shows that people of all abilities can work and get the job done."

Project SEARCH has grown from one original program site at Cincinnati Children's Hospital to more than 650 programs across 48 states and 10 countries. Participating health care organizations include Kaiser Permanente medical facilities, the National Institutes of Health, Cleveland Clinic and the University of Pittsburgh Medical Center. // BY ERIK J. MARTIN



## Getting front-line staff involved in the design process

**P**icture this: A design team spends months and major dollars renovating a space only to open and quickly receive change requests from the staff. The sharps container location is preventing the cabinet from opening; the hand sanitizer is on the wrong side of the door; no one ordered the new trash cans or paper towel dispensers for the new 20-room clinic; and now the team is scrounging to get the clinic operational before patients arrive. These "small" items may not

seem like a major setback to the project, but why is it so difficult to remember to have them available and in the correct location for use?

A possible reason that these small items are overlooked is because spaces are designed without input from day-to-day staff. When designing a clinical space, it is imperative to create multidisciplinary teams consisting of the front-line staff. Anyone who will be working in that space or be responsible for maintaining it should be considered a design influencer. Other than the obvious — nursing and physicians — think about environmental ser-

vices (EVS), infection prevention, radiology and respiratory staff, to name a few.

Engaging these groups at the beginning of the design phase can help identify issues that may not arise until after the space is built. For example, having input from the EVS team may shed light on the fact that the paper towel holders are sketched to be mounted too high beneath a cabinet, which would prevent a technician from being able to open and reload the dispenser.

Some issues to consider before opening design meetings to additional people are to keep an eye on project scope and time creep. It can be difficult to schedule any meeting that will fit many different schedules. Facilities professionals also should be sure to stick to original design deadlines in order to keep the progress moving forward. Also, when including various groups, they should not let the design expand into a "wish list" or a competition for differing priorities.

A tool from the American Society for Health Care Engineering can help by creating a checklist of items that need to be purchased and the final decision-maker for each item. Members can use the link in this box to access the tool. // BY JORDAN PLYLER

### MORE ONLINE

For links to resources, log on to [ashe.org/frontlinedesign](https://ashe.org/frontlinedesign).



## VALUABLE RESOURCES AVAILABLE FROM ASHE

Visit [ashe.org](https://ashe.org) to learn more about the following resources available for health care facilities professionals:

### COVID-19 resources for facilities management

As new variants emerge and hospitals grapple with COVID-19-related patient surges, ASHE is continuing to update its COVID-19 Resources for Health Care Facilities page. Recently added content includes an article on pandemic-resilient hospital design, guidance on ventilation and an article about hospital incident command operations.

### Project Firstline series focuses on ventilation

ASHE has teamed with the Centers for Disease Control and Prevention on a video series for clinical staff. The free video resources are part of the Project Firstline initiative and build on knowledge of why ventilation is critical to the health care environment. The resources provide information on airflow and negative-pressure rooms.

### ASHE Advocacy Tools address common challenges

ASHE's resource library is filled with tools to address common challenges experienced by health care facilities staff. The tools are free to ASHE members and cover topics such as predictive maintenance, behavioral health safety, employee scheduling, infection control risk assessments and more. The resources are created by those involved in the ASHE member tools task force.



## VALUABLE RESOURCES AVAILABLE FROM AHE

Visit [ahe.org](https://ahe.org) to learn more about the following resources available for health care environmental services (EVS) professionals:

### COVID-19 resources for EVS managers

AHE's continually updated COVID-19 Resources for EVS Professionals webpage includes information from the Centers for Disease Control and Prevention on the COVID-19 variant omicron. The site also features training tools such as Project Firstline, Pathways to Clean and the COVID-19 EVS Cleaning Essentials Refresher Training Toolkit, as well as resources to help health care workers deal with stress.

### Virtual workshop for CNACC hopefuls

AHE is hosting a virtual train-the-trainer workshop for its Certificate in Non-acute Care Cleaning (CNACC) program on April 12-14. The CNACC offers front-line cleaning and disinfection workers and technicians a thorough educational opportunity on cleaning in the health care environment outside of acute care settings.

### Interactive tool helps develop EVS skills

The Competency Model for Health Care Environmental Services Professionals is an interactive competency model tool for the entire EVS team, from technicians to directors. The tool can be used to create job descriptions, assess performance, guide professional development, self-assess skill levels and training needs, set improvement goals and determine staff training needs.

## INFECTION PREVENTION

# PPE monitors help to reduce transmission

Personal protective equipment (PPE) monitors can increase the efficiency of infection protection, found a study from members of the University of North Carolina at Chapel Hill Medical Center's (UNC-MC's) infection prevention department. The study was published in the November 2021 issue of the *American Journal of Infection Control*.

UNC-MC began using PPE monitors as part of its COVID-19 prevention strategy early in 2020.

"We were aware based on the literature that it is very common for health care personnel to make errors while doffing their PPE, causing them to self-contaminate skin and clothing, and that PPE monitors can assist with this," says Shelley Summerlin-Long, MPH, MSW, R.N., senior quality improvement leader for infection prevention at UNC-MC and lead author on the study.

To ensure best practices were followed, the medical center developed a multidisciplinary group to train PPE monitors. Monitors received two hours of video- and web-based training based on the Centers for Disease Control and Prevention guidelines. Monitor trainees were then observed during a 12-hour shift to ensure competency.

During the 10-month study period, UNC-MC admitted 1,427 COVID-19-positive patients within the high-risk containment zones. During that time, they experienced only two possible health care-associated COVID-19 transmissions.

In addition to their impact on infection control, UNC-MC found that the availability of PPE monitors helped instill confidence in staff donning and doffing practices. In a housewide survey regarding staff members' view of PPE monitors, 68% agreed or strongly agreed that "PPE monitors played an important role in keeping staff safe by preventing self-contamination during donning and doffing."

Only 13% disagreed, the majority of whom worked in areas where monitors were not always available. // BY MEGAN HEADLEY

## ENGINEERING

## New Penn Med Pavilion achieves LEED certification

There are many aspects of Penn Medicine's new 1.5 million-square-foot, 17-story Pavilion in Philadelphia that helped it achieve LEED Gold certification.

Part of the Hospital of the University of Pennsylvania (HUP), the Pavilion includes 504 private patient rooms and 47 operating rooms. It also houses HUP's emergency department.

Inpatient rooms are capable of handling any acuity, from medical-surgical to intensive care, and designed to decrease noise and improve patient sleep. All operating rooms also are built with future needs in mind, containing panels that can be swapped out to install the latest technology and enabling natural light to flow through large windows.

But even more impressive from an engineering standpoint are the notable design and construction efforts that helped the structure achieve LEED Gold.

The building itself uses 100% outside air through its HVAC system, employing energy recovery wheels to capture and repurpose waste energy. Supply air is distributed from two main mechanical spaces on level 2 and level 15. All air-handling units are manifolded together to supply air to levels 6 and below, and levels 7 and up, respectively.

"Manifold setup allows for us to mitigate the impacts of equipment failure," says Braheem Santos, associate director of HUP's physical plant. "We carefully examine multiple failure scenarios to assess when a thermal impact would be experienced within the building. Thanks to our design, when loss of components happens, our building automation system is intelligent enough to direct equipment accordingly."

The chilled water system includes five 1,250-ton chillers (N+1 redundancy) that operate via manifold distribution; the heating/hot water system incorporates



The Pavilion's rooftop features a full perimeter service catwalk, dedicated exhaust system, cooling towers and boiler flues.

eight 6,000-MB dual-fuel condensing boilers that use natural gas primarily and fuel oil as a backup. And the electrical/emergency preparedness system involves four 2.5-megawatt generators (N+1 redundancy), a critical branch flywheel uninterruptible power supply system, diversified incoming power feeds and three 20,000-gallon subterranean fuel tanks.

Overall, these and other systems at the Pavilion and the organization's energy efficiency efforts are expected to save more than 14% in annual energy costs compared to an average code-compliant hospital. // BY ERIK J. MARTIN

## CHECKLIST

CODES+STANDARDS



### EC chapter revisions cover life safety issues

Effective July 1, The Joint Commission has approved several revisions to the Environment of Care (EC) chapter for hospitals, critical access hospitals, ambulatory health care organizations, assisted living communities, behavioral health and human services organizations, home care organizations, nursing care centers and office-based surgery practices. The chapter revisions cover National Fire Protection Association (NFPA)

#### MORE ONLINE

For links to these reports, log on to [HFMMagazine.com/checklist](http://HFMMagazine.com/checklist)

codes, storage tanks and harm reports involving medical equipment. The changes vary across accreditation programs. Some of the changes include new and revised elements of performance (EPs) that clarify and/or strengthen expectations for accredited organizations as they relate to the NFPA codes

### AHA to help strengthen emergency preparedness

The American Hospital Association recently announced a five-year partnership with the Department of Health and Human Services (HHS) to strengthen and re-imagine the emergency management system for the nation's health care and public health preparedness, response and recovery efforts for disasters and other emergencies. The multimillion dollar, five-year funding period through the HHS Office of the Assistant Secretary of Preparedness and Response is focused on community health resilience, national health security lessons learned from the ongoing pandemic and providing technical assistance across sectors.

### CMS issues statement clarifying co-location guidance

In response to an American Hospital Association request for clarification, the Centers for Medicare & Medicaid Services (CMS) released more information to clarify how its recently updated guidance on hospital co-location with other hospitals or health care facilities might apply to critical access hospitals (CAHs) and physician offices. David Wright, director of CMS's quality, safety and oversight group, stated that the recently issued hospital co-location guidance from CMS is not applicable to CAHs due to the regulatory requirements that they be at least 35 miles or 15 miles by secondary roads or mountainous terrain from another acute care hospital. The full "Guidance for Hospital Co-location with Other Hospitals or Healthcare Facilities (Revised)" is on CMS's website.

### CMS to restart its validation redesign pilot for 2022

The Centers for Medicare & Medicaid Services (CMS) issued its annual report, "Review of Medicare's Program Oversight of Accrediting Organizations (AOs) and the Clinical Laboratory Improvement Amendments of 1988 (CLIA) Validation Program," which details fiscal year (FY) 2019 activities of the approved AO's Medicare accreditation programs as well as the CLIA Validation Program. CMS reports disparity in hospital surveys, noting that state agencies (SAs) identify more physical environment condition-level deficiencies than any other type of deficiency on validation surveys. With this concern, CMS says in the report that the validation redesign pilot program, in which a SA surveyor has direct observation of AO surveyors, is tentatively scheduled to restart in FY 2022.





## NIHD president reviews growth and opportunities

As 2022 president of the Nursing Institute for Healthcare Design (NIHD), **Kelly Guzman**, M.N., R.N., EDAC, is leading the organization through the uncertainties of the pandemic era. This month, she talks to *Health Facilities Management* magazine about these challenges and provides a glimpse into NIHD's growth plans.

### How did you become involved in health care facility planning, design and construction (PDC)?

I spent most of my career in front-line health care operations and management. That allowed me to work on various small construction projects, such as upgrades or remodels, but never any mega projects.

While working at UCLA Medical Center, I was the clinical director for ambulatory and interventional services. In my role, I served as an internal clinical consultant, ensuring consistency and compliance with the regulatory requirements throughout the organization.

Although I did not have the title of project manager, I was utilizing many of the project management skills that I rely on today, one of the most prominent being working with multiple hospital departments and leaders from the medical staff and health care system to achieve a specific goal.

I was asked to serve as the director of transition planning for the Santa Monica UCLA and Ronald Reagan UCLA Medical Center. These projects were my introduction to the field of transition and activation planning and large-scale project management. In my first meetings, I had no idea what language the architects were speaking! Each organization has its own terminology, so being new to the world of transition and activation planning, it was challenging to navigate the middle ground between design and operations.

My experience in this role inspired me to increase my knowledge of health care PDC so that I could lead conversations with both the design and clinical teams.

### Why did you decide to form your own consulting firm?

While working at UCLA, we looked for experienced transition and activation planners to provide a standardized framework and guide us through our project. At the time, very few firms focused on transition and activation planning. There were no standard processes, and literature on the subject was scarce.

Through my role at UCLA, I discovered my passion and set out to pursue a career in consulting. I realized I could help other health care leaders navigate their transition and activation projects.

IMAGE COURTESY OF KELLY GUZMAN

My experience as an internal consultant, coupled with my knowledge of operations, was the perfect mix for a career in transition and activation planning.

For most, transitioning into a new health care facility is a once-in-a-lifetime career opportunity. Although it is an exciting and momentous occasion, the path isn't without challenges. The starkest of the unknowns is how to approach the task. Having been on the owner's side, I understand that anxiety, so my goal as a consultant is to provide health care leaders a framework with tools scalable to a project of any size.

### When did you get involved with NIHD, and what benefits has it provided to you in your career?

In 2012, I met Debbie Gregory, a founder of NIHD, and she shared her passion and vision about the nurse's role in design.

NIHD provided me with the camaraderie of like-minded professionals passionate about the health care environment and its impact on staff and patients. When we are doing something new, it is helpful to brainstorm with colleagues with similar experiences to learn how others have approached their work.

I share this information with my team and clients to apply these lessons learned to their projects.

### How has the clinician's role in health care facility PDC changed over the past decade?

I believe the design team has a better understanding that "a nurse isn't just a nurse." Design input should come from the experts, and that must include nurse leaders. Every patient population and specialty have unique needs. Input from specialty clinicians is required to design a functional space. One of the biggest challenges is translating hospital lexicon with design terminology.

I have observed more clinicians dedicated to facility and space planning in leadership roles within their organizations. The health care organization's culture is essential when planning a new facility. Using the internal expert to translate the organization's needs and vision with the design team's concepts has proven successful.

## THE KELLY GUZMAN FILE

### CV

- Current president and CEO of Yellow Brick Consulting Inc.
- Principal, COO/vice president and executive director of transition planning at Healthcare Technical Services Inc. (2006-2018).
- Executive director of human resources at Karl Storz Endoscopy — America (2005-2006).
- Director of transition planning (2001-2005) and director of clinical services for ambulatory and interventional services (1999-2001) at UCLA Medical Center.
- Director of emergency and medical-surgical services (1997-1999) and director of the emergency department (1992-1996) at White Memorial Medical Center.

### CURRENT AFFILIATIONS

- Nursing Institute of Healthcare Design president (2022) and membership committee (2015-present).
- America College of Healthcare Executives member (2017-present).
- American Organization of Nurse Leadership member (2018-present).
- Association of Perioperative Registered Nurses (2018-present).
- National Association of Hispanic Nurses president (2000-2002), board member (1996-2000 and 2007-2012) and member 1996-present.
- Evidence-Based Design Accreditation and Certification.

### EDUCATION

- Master's degree in nursing, nursing administration, University of California, Los Angeles.
- Bachelor's degree in nursing, Pacific Union College, Angwin, Calif.
- Associate degree in nursing, Rio Hondo College, Whittier, Calif.

### How would you characterize the NIHD's membership?

All NIHD members are passionate about the built environment and its influence on those who occupy the space. We are all committed to creating environments that are aesthetically pleasing, functional and promote healing for their occupants.

NIHD is unique in that not all members are nurses. We are primarily nurses,

but our membership includes architects, interior designers, researchers, transition planners, educators, students and vendor partners. Collectively, this promotes an environment that considers all aspects of the design process.

### How has the pandemic affected NIHD's programs and events?

We've adapted to support our partners and members as best we could. Pre-pandemic, NIHD held in-person meetings and events, which adjusted to 100% virtual during 2020, and now we utilize a hybrid approach. We have seen engagement from members who hadn't participated in past events. During this time, we shared best practices, policies, protocols and lessons learned with each other as our members worked with their organizations to adjust.

In 2020, the Healthcare Design Conference + Expo (HCD) was held virtually. Surprisingly, we had our highest attendance and participation at our annual pre-conference event. Two new virtual programs we launched that have been well received include our coffee talks and new member welcome meetings. In 2022, we will continue to adjust how we engage our members through both virtual and in-person events.

### What are your plans for this year as NIHD president?

I will work closely with our board of directors to implement our strategic plan. We are looking to grow by engaging our members through regular meetings with our coffee chat series, webinars and committee work, and recruiting new members, and industry association and academic partners to engage with NIHD.

Our priorities include increasing membership by 10%, engaging existing partners and identifying four new partners. We will also continue our partnership and clinical association partner roles and recruit our members to represent NIHD at the American Society for Health Care Engineering's PDC Summit clinical track abstract review, the HCD clinical track abstract review and the HCD pre-conference workshop. **HFM**

**Michael Hrickiewicz** is editor-in-chief of *Health Facilities Management* magazine.

# SOLUTIONS

ON OUR RADAR



ON OUR  
RADAR



## 1 ROBOT ROUTE //

The CLOi Autonomous UV-C Robot automatically disinfects high-touch, high-traffic areas. The autonomous robot will move easily around tables, chairs and other furniture to irradiate and disinfect a room's touchable surfaces in minutes. To ensure consistent operation and simplify worker interactions, staff can monitor the robots' progress via remote updates to smartphones or tablets. **LG Business Solutions**

## 2 SECURED ACCESS //

The KeyWatcher Touch key management system features a 7-inch touchscreen with an easy-to-use interface and patented SmartKey system with KeyAnywhere technology, making it simple to withdraw and return a key securely to any key cabinet. The system can create scheduled PDF reports emailed to authorized recipients. **Morse Watchmans**

## 3 POWERED UP //

The Eaton 5PX G2 rack-mount and tower uninterruptible power supply (UPS) provides the maximum power possible at each power rating. The 5PX G2 UPS offers mass UPS firmware upgrades without dropping the load and provides an easy startup configuration wizard simplifying the UPS setup process. The UPS's reduced depth conserves space. **Eaton**

## 4 ON THE RAILS //

Evolution Medical Equipment Management Rail is the life cycle solution to the ever-changing needs of clinical environments. The array of rail, plates, adapters and accessories combine to create a component-based system that is easy to move, change and adapt to existing and future needs. Devices, equipment and management tools snap on and off for total flexibility. **Paladin Healthcare LLC**

### MORE ONLINE

Learn more about these products at [www.HFMmagazine.com/solutions](http://www.HFMmagazine.com/solutions)





### 1 KEEPING DISTANCE //

The Isolation Doorway Communication Station was designed for the Provider 790 System to address current infection prevention challenges. The one-touch communication solution enables direct caregiver-to-patient communication without entry to the patient room. An intercom located outside of each isolation room allows caregivers audio communication with their patients. **Jeron Electronic Systems Inc.**

### 2 READ THE ROOM //

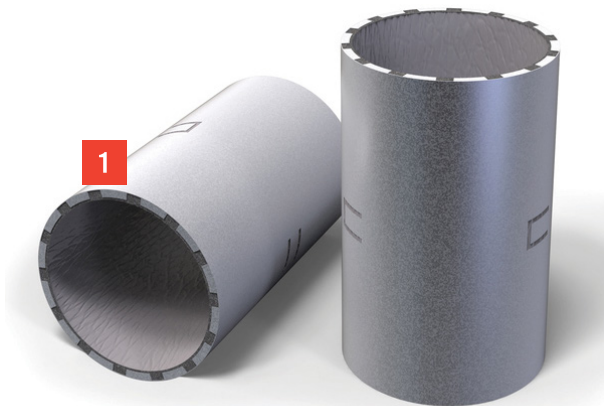
CenTrak's workflow solution can be integrated with a nurse communication system for greater efficiency and automation. It reliably detects when a staff member wearing a real-time locating system-enabled badge enters the patient's room or bay and automatically cancels the call, logs the response time and illuminates the corresponding dome light. **CenTrak**

### 3 TWO-WAY STREET //

The QBOX ConnectView solution equips staff with a powerful tool that can be used during normal patient care as well as during pandemics when isolation is required. From a centralized nurse station or a mobile cart, nurses can monitor, speak or video with, and message patients. Each of these functions is initiated with a single touch of a button. **Quicklert**

### 4 MAKING MOVES //

The Vocera Badge allows for hands-free communication. Caregivers can receive filtered, prioritized alert notifications from the electronic health record about test results, patient status changes and more. The badge can be worn under personal protective equipment and still deliver alerts audibly, decreasing the need to don and doff, and avoiding cross-contamination. **Vocera Communications**



#### 1 FIRE BARRIER //

The SpecSeal Intumescent Sleeve is designed to protect metallic and plastic pipes penetrating through fire-rated floors. Once installed around the penetrating pipe, the sleeve slides along the pipe into the floor opening, allowing for single-side installation without the use of steel screws or hose clamps. It produces rapid expansion to close off burning penetrants and its thin profile is suited to tight spots.

**STI Firestop**

#### 2 SMART DESIGN //

The Smart Connected Fire Sprinkler Monitoring System helps prevent unforeseen emergency repairs in fire sprinkler systems. Users receive notifications for adverse conditions such as freezing pipe temperatures, system air or water pressure imbalances, and water presence so action can be taken before problems occur. **Johnson Controls**

#### 3 COMPLETE CHECK //

The VESDA-E VEA Series of detectors combine VESDA reliability and early-warning smoke detection with pinpoint addressability and a variety of annunciation options. The detectors use patented air-sampling points and multichannel microbore air sampling with three-alarm sensitivity settings. **Honeywell International Inc.**

#### 4 PERFECT SIGHT //

The Signature Optica smoke detector reduces false alarms by differentiating between nuisance particles, like dust or steam, and serious hazards. Compliant with UL 268 standards, the device uses an optical sensor to assess threats. The smoke detector also is available in models that sense heat and carbon monoxide. **Edwards Fire Safety**

#### MORE ONLINE

Learn more about these products at [www.HFMmagazine.com/solutions](http://www.HFMmagazine.com/solutions)





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**See how Gordian's Job Order Contracting can help you overcome the resource scarcity crisis at [gordian.com/ashe](https://gordian.com/ashe)**



# Sanitizers integrated into IPC program

Intensive Specialty Hospital (ISH), Shreveport, La., is a community-focused, long-term acute-care hospital serving northwest Louisiana.

As news of COVID-19 spread around the world in late 2019 and early 2020, the hospital began looking at its day-to-day operations to find practical ways to keep its patients and staff safe. The hospital's efforts in looking for solutions and early preparation for what would become a global pandemic paid off.

Throughout the first wave of the pandemic, ISH treated among the highest number of coronavirus patients in the state. Despite that caseload, as of July 2020 — prior to vaccines being available to health care professionals — there were no instances of the virus spreading among hospital staff or patients.

ISH credits this success to its extensive safety precautions.

In addition to looking for new ways to expand its capability and capacity, the hospital undertook specific actions to procure needed supplies to safely care for the expected surge of COVID-19 patients. Those steps included preventive measures such as purchasing and installing multiple HealthySole PLUS Shoe Sole Sanitizers.

"Before we ever treated our first patient with COVID-19, the ongoing discussion was, 'How are we going to localize this virus to one certain area of the hospital?'" says Dillon Hart, a dual-licensed nurse practitioner at ISH. "We were looking for novel ways to make our staff, patients, providers and referring hospitals feel comfortable. We wanted things that nobody else had, and we wanted things that we knew would work. HealthySole offered a perfect solution for a hospital that was going to have multiple units and treat multiple patients."

The HealthySole device uses ozone-free ultraviolet C (UVC) light technology to eliminate up to 99.99% of common health care pathogens such as methicillin-resistant *Staphylococcus aureus*,



An Intensive Specialty Hospital staff member sanitizes the soles of her shoes before leaving the boundaries of a COVID-19 ward.

vancomycin-resistant *Enterococci* and carbapenem-resistant *Enterobacteriaceae* — as well as more than 99.7% of coronavirus — from shoe soles in just eight seconds.

HealthySole makes its units by using proprietary high-output, plasma-stable UVC lamps, which have patented plastic encapsulation technology. This makes them shatter-resistant and self-cleaning.

Intertek ETL-listed HealthySole devices also are effective against fungi and bacterial spores that travel on shoe soles, which could lead to the spread of infection via inhalation or horizontal translation from surface and air contamination.

Due to the device's ease of use and implementation, ISH and its staff were able to seamlessly incorporate HealthySole into their infection prevention and control protocols and routines. The devices were set up at the entrances to all the hospital's COVID-19 wards and provided a way to keep pathogens from being tracked into and out of a COVID-19 ward to the rest of the hospital. While this

product was being used, the hospital had no patients contract COVID-19 while in their facility.

"Due to the number of safety measures that we put in place, including our HealthySole units, we have had a very positive success rate in treating COVID-19 patients here within our facilities," says Shawn Reed, ISH's director of business development. "The units would be a great benefit to any health care facility that wants to increase its infection control needs. They are easy to use, completely hands-free and they use no chemicals."

For ISH, the HealthySole units also provided peace of mind for staff members because they were another layer of protection that decreased the risk that they would bring the virus home to their loved ones. This is one way the hospital is actively working to stop community spread.

"It offers such immense peace of mind," Hart says of the units. "I have a small child and a wife who works in health care. Knowing when you leave the hospital that you are able to use the HealthySole unit one more time as part of your defense to get home healthy has meant a lot." **HFM**

## Infection prevention

**NEED //** Prevent spread of coronavirus in hospital

**SOLUTION //** HealthySole PLUS Shoe Sole Sanitizers

**RESULT //** Helped to eliminate transmission of COVID-19 among patients



# 2022 HOSPITAL CONSTRUCTION SURVEY

Maintenance staff input leads  
to long-term benefits

ARTICLE BY **BETH BURMAHL** AND DATA BY **JAMIE MORGAN**





**W**hen a hospital is forced to do an emergency repair, it creates a domino effect that can disrupt operations across the board.

If a boiler malfunctions, a hospital could lose heat and hot water, forcing the evacuation of patients to other facilities. If an operating room air handler fails, the hospital may temporarily have to cancel surgeries. The malfunction of an HVAC system could lead to a potentially life-threatening health care-associated infection for a patient or staff member.

And the ripple effects — losing revenue, disrupting staff schedules, reprioritizing capital budgets, etc. — go on from there.

While each of these incidents are costly, stressful, time-consuming and potentially dangerous, they are preventable with routine maintenance.

Nevertheless, emergency repairs are not rare, according to the 2022 Hospital Construction Survey conducted by the American Society for Health Care Engineering's (ASHE's) *Health Facilities Management* magazine, which included responses from 381 facilities professionals at hospitals across the country.

In the last three years, roughly 35% of hospitals surveyed said they have performed an emergency repair on a piece of equipment after deferring maintenance on said equipment.

And hospitals paid the price. When the projects were done under emergency conditions, 86% said the cost was higher by an average of nearly 18%.

So, while investing in maintenance has the potential to save hospitals millions each year, cash-strapped hospitals often are more focused on funding revenue-generating items like new patient services and state-of-the-art technology than paying for upkeep and repair on

items that might — or might not — break down anytime soon.

But hospitals can no longer afford to put off critical maintenance, says Chad E. Beebe, AIA, CHFM, CFPS, CBO, FASHE, deputy executive director of ASHE. He points to recent research by Facility Health Inc. (FHI) showing that the total amount needed to address deferred hospital maintenance today is projected to be \$243 billion across the nation.

"With the amount of deferred maintenance continuing to grow, we eventually will hit a breaking point in health care," Beebe says. "When this happens, hospitals will need to undergo major renovations or possibly even need replacement. We can hope that the breaking point is a slow, manageable situation, but for some facilities it may be catastrophic — that is, major loss of systems that could shut down the entire hospital."

### Costs of deferring

In the survey, respondents cited many of the same emergency repairs stemming from deferred maintenance, including faulty boilers, chillers, HVAC systems (including air handlers, coils, etc.) water pipes, roofing and nurse call systems.

One respondent reported the failure of a main oxygen tank. "This required the repair of valves that should have been replaced years ago. This was just the repair. We are waiting for the replacement."

Other comments include: "Water pipes burst and flooded the outpatient pharmacy," "Upgraded HVAC for long-term care facility," and "Chilled water coil and tube rupture could not be repaired, forcing an emergency replacement."

More than 46% incurred additional expenses related to the emergency repair, including renting substitute equipment;

revenue loss from cancelling MRIs, CT scans and surgeries; overtime costs for staff; flood damage; and temporary relocation of services.

To move the needle on funding maintenance projects, experts say change must occur in two areas. Facilities managers must push harder to get maintenance costs included in hospital budgets, and maintenance staff must be included in every phase of design and construction for new projects and renovations.

Traditionally a lower priority, deferred maintenance funding may not even be included as a line item in some hospital budgets, Beebe says. Facilities managers need to make a case clearly and consistently for funding nonrecurring maintenance with hospital administrators, including a breakdown of costs associated with emergency repairs. If need be, they should keep asking.

"What happens is that facility managers ask for funding, they don't get it and then they give up," Beebe says. "You need to protect yourself as a facility manager. Make sure hospital administrators keep hearing why this funding is necessary."

In the 2022 survey, budgets for non-recurring maintenance are roughly on par with expectations, says Jonathan Flannery, MHSA, CHFM, FASHE, FACHE, senior associate director of advocacy for ASHE. While very few hospitals got their entire nonrecurring maintenance requests approved, nearly one-third of respondents are getting more than 70% of their budgets approved.

"There is never enough time, money or staff to get every project funded," Flannery says. "Considering the impact of COVID-19 on health care, getting 70% of a budget approved is about what we expect. Unfortunately, that still means a lot of preventive maintenance isn't getting funded."

## THE IMPACT OF DEFERRED MAINTENANCE AND EMERGENCY REPAIR PROJECTS

### Percentage of nonrecurring maintenance projects budget that has been approved for 2022

0-20%	21%
21-40%	18%
41-60%	20%
61-80%	20%
81-100%	21%

### Organizations that have completed an emergency repair project after deferring maintenance

Yes	35%
No	65%

### How did the cost of the emergency repair differ from the deferred project estimate?

Increased	86%
Decreased	8%
Stayed the same	6%

### Organizations reporting other financial impacts due to an emergency failure and repair

Yes	46%
No	54%

# 18%

Average cost increase between deferred project estimate and emergency repair.

Source: *Health Facilities Management*/ASHE 2022 Hospital Construction Survey

### Getting maintenance input

Early in his career Flannery says he learned a valuable lesson about the importance of including the input of maintenance staff on design/construction or renovation projects and their role in preventing emergency repairs.

As a general engineer/projects manager, Flannery made the decision to install epoxy flooring in the hydrotherapy rooms as a solution to stop water leaking from the floor into the ceiling spaces below. He soon realized that option wasn't working.

"We stopped the leaks, but there were other issues with epoxy flooring that were not effective for our purposes," Flannery says.

When he was promoted to supervisor of maintenance and operations at the same facility, he asked maintenance staff for input on a new flooring solution. Ultimately, the team removed the epoxy flooring and repaired the original ceramic tile flooring — a costly but effective solution.

"If I had involved the maintenance staff during the design process from the beginning, we would have followed their recommendation and could have saved significant time and effort," Flannery says. "Since then, I made sure maintenance staff was included in every design/construction project."

According to the survey, hospitals are already moving heavily in that direction. A resounding 92% of hospitals say they include maintenance staff in the design and construction process, primarily in the construction, design development and occupancy/punch list stages.

While that is good news, Joseph Sprague, FAIA, FACHA, FHF, principal and senior vice president at HKS, Dallas, says there is still work to do.

"That number should be 100%," Sprague says. "Defining operational and maintenance issues that might not seem to be a priority sets the stage for any successful plan of action in terms of changing the old system to a new system."

Maintenance staff who work with hospital systems, processes and products every day understand the facility's needs in ways a designer or architect might not recognize, says ASHE President Shadie (Shay) R. Rankhorne Jr., SASHE, CHFM, CHC, senior director of facilities management at Quorum Health, Brentwood, Tenn.

"The maintenance team already knows the building(s) and can help identify



## Maintenance staff plays key design and construction role

**A**s the eyes and ears of the hospital, maintenance staff can give critical input on designing the facilities they oversee on a day-to-day basis.

Recognizing that value, a vast majority of hospitals are including maintenance staff in the design/construction process, according to the 2022 Hospital Construction Survey conducted by the American Society for Health Care Engineering's (ASHE's) *Health Facilities Management* magazine.

Respondents shared success stories anonymously for the survey that showed 92% of hospitals include maintenance staff in the design/construction process.

One hospital planning a large conference room changed its design when the maintenance staff suggested splitting HVAC systems and adding an accordion divider to maximize use for multiple small and/or one large gathering.

Said another respondent: "By involving the maintenance staff on a computed tomography replacement and room renovation, we were able to budget for the lack of proper HVAC in the area and avoid costly overruns."

Another added: "Being a relatively small rural acute care hospital, the maintenance staff are all skilled trades and are very involved in the entire construction process."

While designers, architects and contractors have long had a seat at the design/construction table, maintenance staff has not always been part of the process.

"When I got into health care as a tradesman 25-plus years ago, we often were not involved until it was time to get trained on the new equipment that was already installed and running," says ASHE President Shadie (Shay) R. Rankhorn Jr., SASHE, CHFM, CHC, senior director of facilities management at Quorum Health, Brentwood, Tenn.

Since then, hospitals have learned the hard way that maintenance input can avoid duplication of efforts, prevent

costly errors and ensure standardization throughout the facility, among other benefits.

Essentially, maintenance input helps hospitals get design/construction projects right the first time.

"The role of maintenance staff in design and construction has become bigger and more important over the years," says Chad E. Beebe, AIA, CHFM, CFPS, CBO, FASHE, deputy executive director of ASHE. "Hospitals know that including the input of maintenance staff helps ensure the efficiency and long-term value of the system, potentially saving millions of dollars."

Staff who know every inch of the building can give valuable input on everything from complex hospital operations and floor layouts to choosing products, vendors and equipment.

"Maintenance staff are typically able to see constraints in utility systems before they are inadequately designed by engineers who may not have accurate information regarding existing conditions because of small changes added over time," said one respondent.

As COVID-19 continues, maintenance staff are drawing on years of expertise to meet multifaceted challenges related to creating a safe environment for patients and staff.

"During the design of a bone marrow transplant suite, maintenance staff were able to point out issues with the proposed HVAC system design and the need to include a separate air handler in the design," said one survey respondent.

As more hospitals realize the value of including maintenance input from a design, cost and patient perspective, their role will only continue to grow.

One respondent summed it up: "Design and construction own the project for a few years. Maintenance staff owns the project for decades." ■

### MAINTENANCE DEPARTMENT INVOLVEMENT IN DESIGN AND CONSTRUCTION

**Does your organization involve maintenance staff in the design and construction process of new and/or renovation projects?**

Yes	92%
No	8%

Source: *Health Facilities Management*/ASHE 2022 Hospital Construction Survey

**At what stage of the design and construction process is maintenance staff involved in new and/or renovation projects?**

Development of design standards	19%
Concept design	15%
Schematic development	15%
Design development	27%
Construction documents	21%
Construction	26%
Occupancy/punchlist	28%
All of the above	47%



existing issues and avert potential new problems due to existing condition limitations,” Rankhorn says. “They are an additional set of eyes to catch things others may have missed. They can see impacts to daily operations that benefit or hurt the overall productivity of the team or impact customer experience in a way the designer may not have anticipated.”

Beebe says involving staff as early as possible — including in concept and schematic phases — equips the team with necessary information going into the project. For example, if the design team chooses a new technology for heating and cooling, it might require special tools or skills to operate or maintain. Or certification might be required. The maintenance staff can add that valuable input from the beginning.

“Other team members might not see the types of connections that maintenance staff are aware of, so it’s important to involve them as early as possible,” Beebe says.

### Positive general trends

Overall, the survey offered some positive takeaways for hospitals, including increases in commissioning and certification, and a steady increase in budgets for design/construction projects. And as COVID-19 continues to impact the economy, hospital funding decisions are being driven at least in part by the pandemic.

“COVID-19 has been and still affects everything moving into the future in terms of hospital funding,” Sprague says. “Preparation for the next pandemic will facilitate appropriate response.”

In terms of budget increases, many hospitals are playing catch-up and resuming active construction projects that shut down when COVID-19 started.

Simultaneously, hospitals facing labor shortages, supply chain disruptions, rising prices and increased demand may be forced to increase budgets, says Adam Ashouri, senior project manager at Meyer-Najem Construction Co., Indianapolis, and a member of the ASHE Young Professionals Committee. And they are facing competition for supplies and labor.

“If a hospital system wants to build a \$100 million patient tower and another company is building a massive warehouse three miles down the road, they will both compete for labor and supplies,” Ashouri says. “Hospitals should understand the market forces at work

## CONSTRUCTION BUDGETS

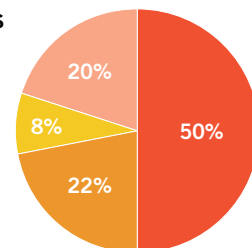
### Construction projects and key performance indicators

On or under budget/on or ahead of schedule: **50%**

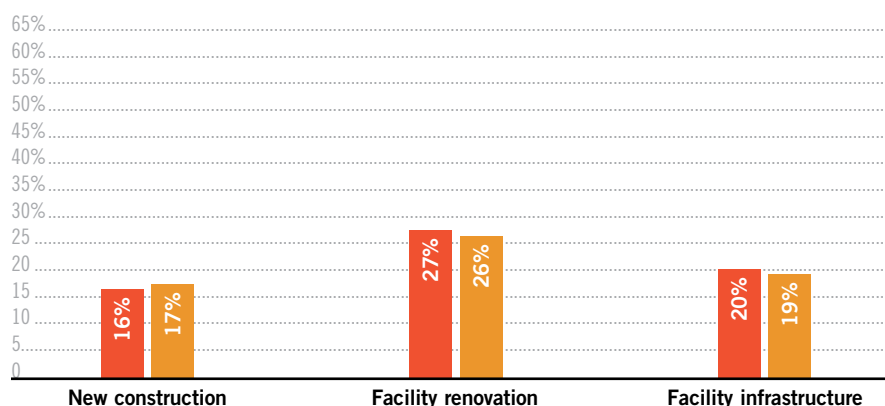
On or under budget/behind schedule: **22%**

Over budget/on or ahead of schedule: **8%**

Over budget/behind schedule: **20%**



### Percentage of hospital's capital budget allocated to construction projects (average)



### Change in hospital's capital budget allocated to building projects from previous year

Hospital new construction



Hospital renovation



Hospital infrastructure upgrades



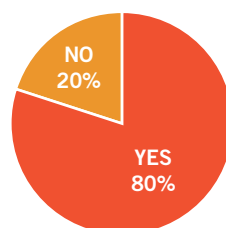
Off-site facilities



● Increase ● Decrease ● No change

## COMMISSIONING AND CERTIFICATION

### Health care facilities that commission health facilities projects



### Which of the following does your organization require for its general contractors?

Certified Healthcare Constructor: **37%**

None: **21%**

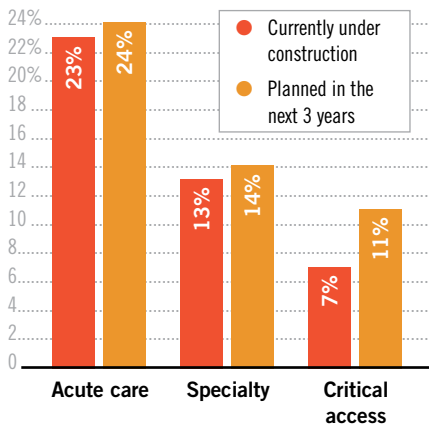
Certified Health Care Physical Environment Worker: **10%**

Other: **6%**

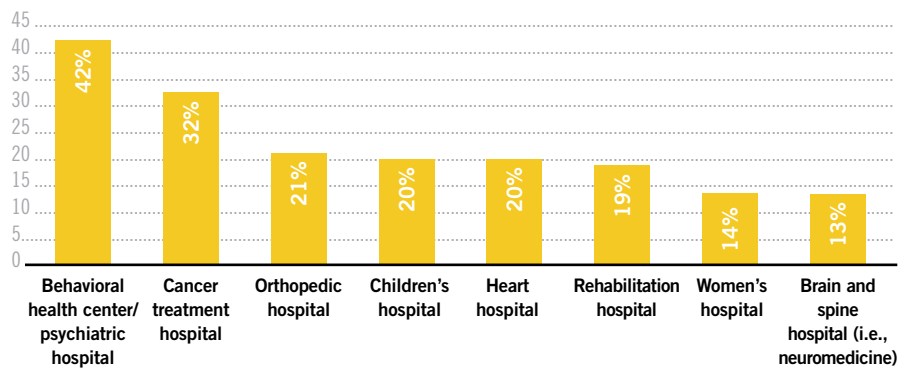
Source: *Health Facilities Management*/ASHE 2022 Hospital Construction Survey

## FACILITIES PROJECTS

### Hospital\*



### Specialty hospital projects under construction or planned over the next three years



### Other facility projects\*

	Currently under construction	Planned in the next 3 years
Physical plant infrastructure upgrade	16%	21%
Ambulatory facility	12%	15%
Medical office building	9%	18%
Central energy plant	6%	10%
Freestanding emergency department	5%	5%
Parking structure	5%	11%
Rehabilitation center	5%	7%
Centralized clinical laboratory	3%	7%
Assisted living facility	3%	3%
Data center (information services)	2%	6%
Fitness and wellness center	2%	7%
Urgent care clinic	2%	7%
Freestanding imaging facility	1%	7%
Long-term care facility	1%	4%
Retail health clinic	1%	5%
Telehealth/virtual care facility	1%	2%
Immediate care facility	1%	4%
Intermediate care facility	0%	3%
Microhospital	0%	3%

### Services/departments\*

	Currently under construction	Planned in the next 3 years		Currently under construction	Planned in the next 3 years
Imaging	15%	15%	Rehabilitation services	4%	6%
Surgery	12%	14%	Inpatient telehealth/virtual care services (e.g., eICU, telestroke, etc.)	3%	5%
Behavioral health services	9%	11%	Bariatric care/surgery centers	3%	2%
Pharmacy	8%	9%	Orthopedics	3%	3%
Ambulatory care	7%	16%	Clinical observation units	3%	5%
Emergency department	7%	18%	Urgent care center	2%	2%
Cancer center	7%	12%	Sleep disorders center	2%	2%
Interventional suites (surgery and imaging)	7%	7%	Outpatient telehealth/virtual care services (e.g., home telemonitoring, follow-up visits, etc.)	2%	3%
Cardiology	6%	8%	Neurology/neuroscience	1%	2%
Laboratory	5%	11%	Simulation center	1%	1%
Isolation/clean rooms	5%	10%	Wellness center	1%	2%
Women's health/obstetrics	5%	6%	Innovation center	1%	0%
Critical care	4%	6%	Wound care center	1%	2%
Pediatrics	4%	5%			

Source: *Health Facilities Management*/ASHE 2022 Hospital Construction Survey

\* Does not include regional and national health care system respondents

in their area and ensure that the risks associated with the forces are mitigated. Sometimes, this may mean bigger budgets to compete."

To survive in a volatile market, more contractors are securing early procurement packages for materials like steel, roofing and major equipment, locking in prices at the time of purchase before they escalate, he says.

"And more owners are allowing contractors to bill for stored materials,

which insulates them from market risk associated with price escalations outside of the contractor's control and, in many cases, can help secure more competitive pricing," Ashouri says. "In many cases, it can be a benefit to engage a construction manager early in a project to help navigate industry trends and manage the owner's schedule and budget risk."

Hospitals continue to invest in acute care facilities in terms of new, replacement and expansion/renovation projects.

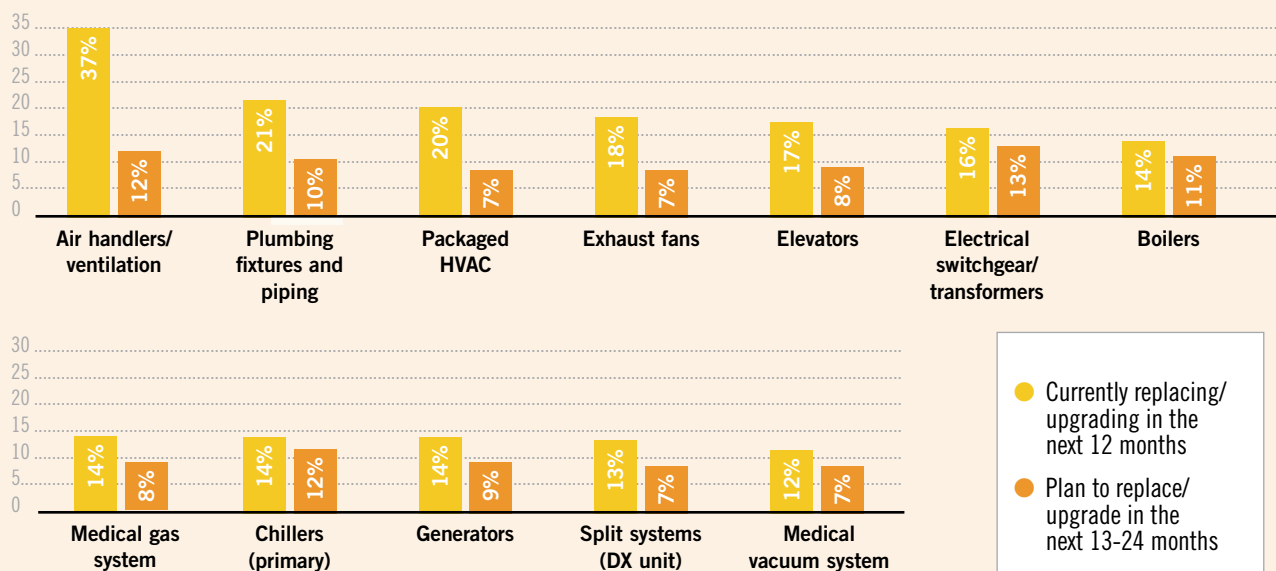
Hospitals with acute care projects underway or in the planning stages increased from 16% in 2021 to 23% in 2022.

The survey also shows a sizeable increase in hospitals building or planning physical plant infrastructure projects, which increased from 11% in 2021 to 16% in 2022. Beebe says this also has a COVID-19 connection.

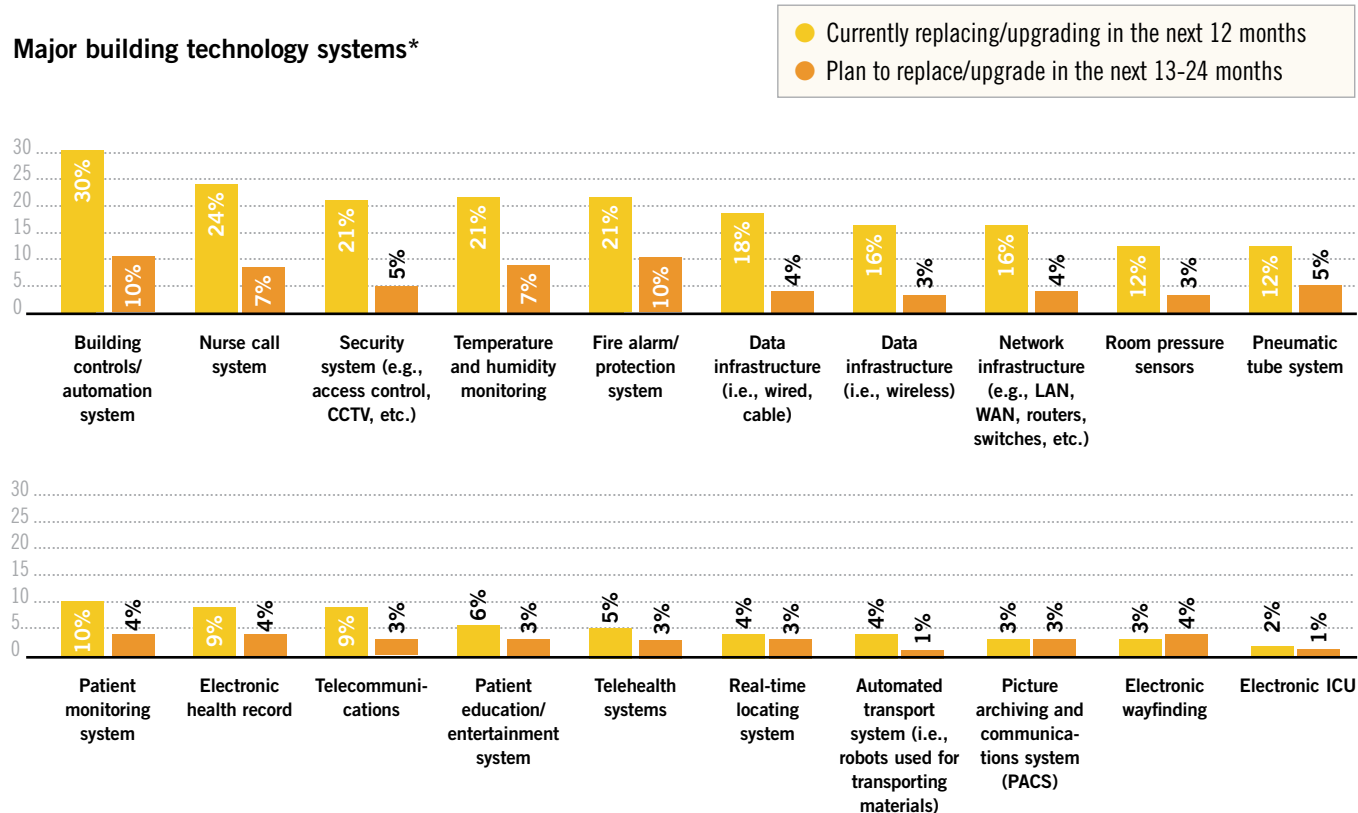
"Hospitals investing in physical plant infrastructure are preparing for the future in terms of surge capacity," Beebe says.

## INFRASTRUCTURE PROJECTS

## Major building services equipment\*



## Major building technology systems\*



Source: Health Facilities Management / ASHE 2022 Hospital Construction Survey

\* Does not include regional and national health care system respondents



"They want to be ready to handle future pandemics or other emergency needs with a high influx of patients."

Hospitals are allotting more funding for emergency departments (EDs), ambulatory care and security systems, and many are focusing on flexibility and adaptability to maximize physical space. Some are examining the feasibility of having one central entrance versus multiple entrances to aid in directing patients to the right areas while limiting exposure points.

"COVID-19 revealed just how vulnerable a hospital's infrastructure can be," Rankhorn says. "Operationally, there is an ongoing focus on how to improve throughput. Hospitals are reviewing practices and necessary design changes in patient care and other areas of the hospital."

Hospitals also continue to invest in behavioral health care centers, with 42% of respondents planning a specialty hospital saying they have one underway or planned for the next three years. This focus isn't likely to change soon, Sprague says.

"Behavioral problems will continue to be a priority," Sprague says. "Recently, issues have developed from pandemic burnout felt by both patients and staff at hospitals."

Hospitals also are investing in cancer, pediatric hospitals and cardiac projects now and in the next three years.

The aging population is driving consistent investment in rehabilitation projects and a rise in orthopedic construction projects, which jumped from 14% in 2021 to 21% in 2022 among those working on a specialty hospital project, which is in line with what Ashouri is seeing in the field.

"We are seeing a big shift toward geriatric care in response to the aging population," Ashouri says. "That is an area where we are expecting a future surge in the industry."

Hospitals may be moving away from building microhospitals, which were a rising trend in recent years. In 2022, not one hospital in the survey reported an active microhospital project, while 3% are planning one in the next three years.

"Many hospitals have realized that microhospitals weren't the answer they were looking for," says Beebe, citing strict regulatory requirements and reimbursement issues as factors in the drop.

COVID-19 also is driving increasing investments in equipment such as air handlers, packaged HVAC systems, exhaust fans and temperature/humidity controls that are necessary for controlling airborne infections. These investments also tie in with hospital goals for energy efficiency.

More than 30% of hospitals plan to replace or upgrade their building controls/automation systems now or in the next year.

"The surge in building automation is a direct reflection of COVID-19," Flannery says. "All hospitals are focused on optimizing those systems to contribute to a safer work environment and stay up to code."

The survey also shows an increase from 2021 to 2022 in purchases of automated transport systems, or robots used for transporting materials, which cuts down on the person-to-person contact that may spread germs.

### Critical for the future

As COVID-19 continues for the foreseeable future, more hospitals are seeking higher safety and training credentials from the general contractors working for them. Hospitals requiring two ASHE certification credentials jumped substantially in just one year.

Nearly 37% of hospitals now require contractors to have ASHE Certified Healthcare Constructor credentials, up from 20% in 2021. Roughly doubling 2021 numbers, 10% of hospitals now require contractors to achieve Certified Health Care Physical Environment Worker Certification, commonly known as the ASHE Worker Certification.

"The pandemic really shed light on the need for all contractors to be fully prepared," Beebe says. "By requiring workers to earn these certifications, hos-

pitals can reduce risks by ensuring people working in their facilities understand important patient safety concepts."

More hospitals are also commissioning — conducting an audit to review energy performance, safety and sustainability, among other factors — the survey

shows. The number of hospitals that are commissioning jumped from 74% in 2021 to 80% in 2022.

Commissioning, which is integral to sustainability and energy conservation, also ties closely to reliability-centered maintenance, a strategy and process designed to promote the reliability of equipment, systems and structures.

"ASHE has worked hard to increase participation in both credentialing and commissioning," Beebe says. "Both of these initiatives are critical to the future of health care, so ASHE is very happy to see these numbers continue to increase." **HFM**

### ASHE RESOURCE



American Society for Health Care Engineering members can access the monograph "Health Facility Design Information Checklist" by logging on to [ashe.org/checklist](https://ashe.org/checklist).



**Beth Burmahl** is a Carbon Cliff, Ill.-based contributor to *Health Facilities Management* and **Jamie Morgan** is editor.

## About the 2022 Hospital Construction Survey report

The American Society for Health Care Engineering's *Health Facilities Management (HFM)* magazine surveyed a random sample of 4,962 hospital and health system executives to learn about trends in hospital construction. The response rate was 7.6%. *HFM* thanks the sponsors of this survey: Gordian Inc., Greenville, S.C., and W.W. Grainger, Lake Forest, Ill.





The skyline of New Orleans, home to this year's PDC Summit.

# PDC Summit preview

A look at the International Summit & Exhibition  
on Health Facility Planning, Design & Construction

Senior leaders from hospitals, design firms and construction companies will gather on March 20-23 in New Orleans to share perspectives on optimizing healing environments at the International Summit & Exhibition on Health Facility Planning, Design & Construction (PDC Summit).

The PDC Summit is hosted by the American Society for Health Care Engineering (ASHE) of the American Hospital Association (AHA) in collaboration with the Academy of Architecture for Health of the American Institute of Architects, the American College of Healthcare Architects, the Association for Professionals in Infection Control and Epidemiology, the Facility Guidelines Institute, the International Association for Healthcare Security and Safety, and the Nursing Institute for Healthcare Design.

It is the one conference with an integrated audience of C-level, design, construction and operations professionals, with more than two-thirds of attendees returning to the event each year. Moreover, 100% of conference revenue is reinvested into the mission of optimizing the health care physical environment.

## Cutting-edge topics

PDC Summit programming offers cutting-edge topics affecting the future of the health care built environment

and delivers thought-provoking research and presentations focusing on compliance, collaboration, sustainability, designing for future generations, technology integration and more.

In addition to the educational sessions and a world-class exhibition of products and services providers, the PDC Summit will feature entertaining and interesting general sessions, including:

- **Keynote session: "Embedding Innovation into Everyone's DNA"** — Innovation is not something that happens by chance: The secret sauce lies in the culture created at work. So, how can an organization create a culture that embraces risk and entrepreneurialism, allowing everyone to innovate? In his keynote speech, 25-year senior executive of The Walt Disney Company and design thinking and innovation consultant Duncan Wardle will share how he infused a culture of innovation across Disney, a company known for redefining pretty much every industry it touches. Wardle's decades of success were a direct reflection of his ability to create a thriving, innovative culture, and to ensure that everyone on his teams were put in a position to let their inner creativity run wild. He will share the exact steps and strategies used to create such an environment.

- **General session: "Moving the Needle Toward Environmental Sustainability and Decarbonization"** — With health care accounting for 10% of all U.S. greenhouse

gas emissions, environmental sustainability and decarbonization of health care are at the forefront of the climate action conversation. Climate deadlines and calls to action dominate the evening news and legislative agendas. However, the idea of decarbonizing the entire health care sector is more than a little overwhelming. Hospitals and health systems have a vested interest in the climate conversation, not only because of climate change's impact on public health and critical health care delivery infrastructure but also because the complex energy and resource needs of hospitals and health care systems directly contribute to health care's carbon footprint. In this session, AHA and ASHE health care sustainability experts will provide an overview of the complex concepts of environmental sustainability and decarbonization through the AHA policy lens, demonstrate tasks to empower attendees with practical ways to get started, and provide perspective on changing culture and engaging teams to work together in a joint effort to move the needle.

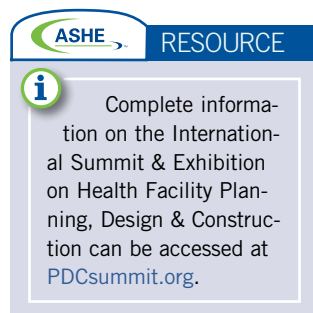
• **General session: "Greater of Two Evils: Hurricane in a Pandemic"** — Though the COVID-19 global pandemic has dominated daily lives and the health care space, health care providers across the country have simultaneously faced additional varied and compounding emergency events including hurricanes, tornadoes, flooding, winter storms, utility outages and mass tragedies. Through a thoughtful panel discussion between multiple health care provider representatives, attendees will hear retrospective lessons learned from

real-world emergency events and how to apply those lessons to future PDC efforts. Discussion includes detailed lessons learned for hardening infrastructure, preparing emergency response plans and integrating emergency plans into the PDC process to mitigate future event risks.

• **General session: "Design Lessons Learned From COVID Ground Zero"** — In this session, attendees will learn from leaders from the nation's first hospital to respond to multiple COVID-19 patients, proving the U.S. health care field was to experience a worldwide pandemic. Officials from Evergreen-Health in Kirkland, Wash., will share what worked in their facility and what could be designed in the facilities of the future to better respond to a pandemic.

• **Closing general session: "An Insider's Look at the 2022 FGI Guidelines"** — The Facility Guidelines Institute's *FGI Guidelines for Design and Construction* documents are developed by professionals with a dedication to health and residential care and who have spent thousands of hours preparing the 2022

series of *Guidelines* for publication. In this session, members of the 2022 Health Guidelines Revision Committee highlight changes in the 2022 *FGI Guidelines*, including new and revised behavioral and mental health spaces, clinical treatment areas and patient care units. Updates revisit familiar topics (e.g., emergency department treatment areas) and reflect new perspectives (e.g., emPATH units), all while balancing the need to make health care design affordable, accessible and maintainable. **HFM**



## Harness the power of networking at PDC Summit

**N**ow more than ever, the quantity and quality of a health facilities professional's social network is critical to access and leverage connections and information. The International Summit & Exhibition on Health Facility Planning, Design & Construction (PDC Summit) is the one conference that has a balanced representation of the full health care PDC team.

Through blending perspectives, the PDC Summit program offers a collaborative approach to building and renovating health care facilities. PDC Summit attendees include:

• **Hospital administrators.** New construction and renovation of a health facility is a major investment. Senior administrators with responsibility for the design and construction of health facilities should attend to gain insight on the strategic outlook for the health care physical environment and assess how to maximize operational efficiency through design.

• **Architects.** Whether they want to learn what's new in the Facility Guidelines Institute's *Guidelines for Design and Construction* or hear case studies on evidence-based design, the PDC Summit provides architects with timely information that will affect health care facility PDC now and in the future. They

can assess the long-term outlook as well as current trends and innovations by hearing from a variety of top field professionals, including architects and those in the health care C-suite.

• **Interior designers.** Interior designers provide a unique perspective to health care PDC. Attending the PDC Summit will give interior designers the technical knowledge they need to provide health care facilities with sustainable designs and to plan for effective patient healing environments.

• **Construction professionals.** Whether they're attending the Certified Healthcare Constructor exam review course, listening to a case study presentation on Lean methodologies or networking with prospective clients at one of the receptions, health care construction professionals will walk away from the PDC Summit with valuable knowledge and business connections.

• **Facilities management professionals.** Maximizing the efficiency of design and construction projects is critical to a health facility's bottom line. Facilities managers and engineers working to optimize the physical environment of health care facilities will gain insight from the PDC Summit on innovative operational strategies that complement design and construction initiatives. ■





The remote oxygen concentrator system is lifted into place at Pali Momi Medical Center in Hawaii.

# Oxygen concentrator relieves med-gas issue

Hawaiian hospital finds solution for pandemics and other emergencies

BY TONY MOISO, CHFM, CEM

**T**he Hawaiian Islands are the most geographically isolated group of islands on Earth, located more than 2,000 miles from the nearest continental land mass. Because of this, health care facilities managers in Hawaii are always looking for ways to improve resiliency.

To this end, the American Society for Health Care Engineering (ASHE)-affiliated state chapter, Hawai'i Society for Health-care Engineering (HISHE), explored the topic of oxygen concentrators at its August 2021 chapter meeting. After the meeting, several health care systems were considering the viability of installing concentrators in their hospitals.

Then, the COVID-19 pandemic Delta surge hit the islands, and one of the side

effects was a shortage of oxygen. This made the decision much easier, and all three of the major health care organizations in Hawaii decided to proceed with projects at their facilities.

The story of one of those facilities — Pali Momi Medical Center in Aiea, Hawaii — should be of interest to all health care facilities managers because similar pandemic impacts have occurred on the mainland. Moreover, climate change is causing more frequent and more intense storms, which also can have an impact on oxygen use and delivery.

## Emergency declared

In August 2021, an emergency was declared by the state of Hawaii, and all oxygen production was reserved for

PHOTO COURTESY OF PALI MOMI MEDICAL CENTER

medical customers. The state only has two small air separation plants on the island of Oahu and none on the neighboring islands. Due to the COVID-19 pandemic Delta variant surge, the increased demand for medical oxygen required that production from the plants be ramped up to full capacity, and supply for all industrial customers was curtailed.

Health care facilities like Pali Momi Medical Center, part of the Hawai'i Pacific Health (HPH) not-for-profit health care system, were required to monitor and report usage daily. Everyone was asked to try and conserve oxygen. This required understanding how the oxygen was being used and how much each type of respiratory therapy demanded. Facilities managers were forced to learn more about the details of their bulk liquid oxygen and distribution systems.

Almost all hospitals and health care systems lease their bulk liquid oxygen systems from industrial gas companies, which design, construct and maintain the systems. Consequently, not all health care facilities managers are intimately aware of the operation and capabilities of their oxygen systems.

All managers have a working knowledge, but not all know the system capacity. The maximum system capacity is based on tank volume, vaporizer capacity, and distribution piping size or flow limits. Health care facilities managers have multiple sources and tools to help determine their system's capacity.

First, they should work with their suppliers to verify the tank size and vaporizer capacity. For the actual capacity of the facility's piping and distribution system, Kaiser Permanente's national facilities services' facilities strategy planning and design department published a document on medical air and oxygen capacity that can assist facilities managers in calculating their system's capacity. It can be accessed though ASHE's COVID-19 resources page at [ashe.org/COVID19resources](https://www.ashe.org/COVID19resources) by clicking on the "Ventilator capacity for existing medical gas systems" link.

*Med Gas Insights* from BeaconMed-aes, Issue 8, April 2020, is another great resource for researching how oxygen is being used in a hospital. By using this article, which can be accessed on ASHE's website at <https://bit.ly/3GTssw8>, and working with the respiratory therapy manager, Pali Momi Medical Center staff members were able to put together

## A technology comes of age

Oxygen concentrators have reached the level of reliability, economic performance and clinical acceptance that health care facilities are beginning to install and operate them, particularly in many areas outside of the U.S. where traditional supplies are expensive, unreliable or simply unobtainable.

While previous editions of codes did not technically prohibit the use of oxygen concentrators, there was a significant lack of information to ensure that their specifications and installation would meet the requirements to supply oxygen for medical use.

Beginning in the 2018 edition, the National Fire Protection Association's NFPA 99, Health Care Facilities Code, introduced requirements for the use of these devices. The code now outlines requirements for the use of concentrators to supply the oxygen central supply and/or the use of portable concentrator units that can be used at the patient bedside. The requirements for central supply and portable units in NFPA 99 are mostly directed to manufacturers to ensure the reliability of these systems and the protection of the patients, but it would still be incumbent on the one specifying the equipment to ensure compliance with NFPA 99.

While changing to oxygen concentrators as the sole supplier for a piped oxygen system may sound like a perfect answer to rising costs, supply shortages and service delays, it is important to analyze a health care facility's needs and ensure that the system would be capable of supplying the desired product.

There are two very different types of medical oxygen that can be used for patients, "Oxygen USP," which is required to contain 99% or more oxygen; and "Oxygen 93 USP," which contains not less than 90% and not more than 96% oxygen. Concentrators may be available to produce both, but predominantly concentrators currently on the market supply Oxygen 93 USP.

While most patients are prescribed a mix of oxygen and medical air, there may be some instances where 99% oxygen is necessary. ■

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Sidebar by Chad E. Beebe, AIA, CHFM, CFPS, CBO, FASHE, deputy executive director for the American Society for Health Care Engineering.

the table on page 32 for determining oxygen usage.

Finally, ASHE has a Medical Air and Oxygen Capacity Assessment Tool that was designed to help hospitals and health care systems evaluate piped medical gas system capacity. The tool can show the usage of a particular medical gas system when different types of therapies are in use. It can be accessed at [ashe.org/medical-air-and-oxygen-capacity-assessment-tool](https://www.ashe.org/medical-air-and-oxygen-capacity-assessment-tool).

At Pali Momi Medical Center, the bulk liquid oxygen system capacity was being pushed to its limit. By working with their supplier, Airgas USA LLC, and using some of the available tools, facilities professionals determined that the vaporizer was the limiting factor.

Vaporizers will always have a small amount of ice accumulation, but when flows reach or exceed design rates, there can be a significant accumulation of ice on the vaporizer fins, which reduces the efficiency of the heat exchange process. Pali Momi Medical Center's maintenance

staff began daily inspections on each shift and instituted a deicing process using water. (Hot water and steam also can be used and may be more effective in colder climates).

Additionally, working with the Healthcare Association of Hawaii, the Hawaii Emergency Management Agency (HI-EMA) and HPH, Pali Momi Medical Center explored the possibility of installing an oxygen concentrator to help ease the demand for oxygen in the state.

### Proven technology

Oxygen concentrator technology was first introduced in 1972, and concentrators were installed in hospitals in the U.K. starting in 1979 and in Canada in 1985. The U.S. is one of the few countries where oxygen concentrators are not used as a primary source for oxygen in hospitals. In the 2018 edition of the National Fire Protection Association's NFPA 99, Health Care Facilities Code, oxygen concentrators were added as a Category 1 source.

THERAPY	TOTAL GAS (LPM)	FIO <sub>2</sub>	AVG. O <sub>2</sub> CONSUMPTION
Standard nasal cannula	1 - 4	24% - 36%	2.5
Simple mask	6 - 10	40% - 60%	5.0
Oxymizer	1 - 15	28% - 100%	5.4
Non-rebreather mask	12 - 15	60% - 80%	10.5
High flow nasal cannula (HFNC)	12.6 - 60	21% - 100%	23.7
Ventilator	60 - 150*	21% - 100%	23.7
BiPAP	60 - 120	21% - 100%	47.4

\* = Typically set at 60

A table for determining oxygen usage was devised by Pali Momi Medical Center staff using vendor literature and working with the hospital's respiratory therapy manager.

United States Pharmacopeia (USP) specifies that "Oxygen USP" contains not less than 99% by volume of oxygen, and also specifies that "Oxygen 93 USP" contains not less than 90% and not more than 96% by volume of oxygen. Oxygen concentrators produce Oxygen 93 USP. It is important to involve respiratory therapy and anesthesiologists in the decision to install an oxygen concentrator and discuss any concerns regarding the use of Oxygen 93 USP.

After getting buy-in from the organization, the decision was made to purchase an oxygen concentrator by the end of August 2021. Capital funds were approved the first of September, and a purchase order was issued on Sept. 6.

Once the decision was made to purchase and install an oxygen concentrator, the size, location and where to connect to the existing system had to be determined. Pali Momi Medical Center decided to purchase a remote oxygen concentrator system (ROCS), which is a completely assembled system in a 20-foot intermodal shipping container.

Pali Momi Medical Center doesn't have the space in its central plant for a system, so the ROCS solution proved ideal. The container was placed just outside the central plant in an adjacent, open parking garage and connected to the existing system using the emergency oxygen supply connection. Pali Momi Medical Center purchased the largest system available that could produce up to 600 LPM of Oxygen 93 USP.

Given the supply chain issues that were impacting all industries in the U.S. at the time, there was a concern about

the logistics and how long it would take to ship the unit from Manitoba, Canada, to Hawaii. Fortunately, because an emergency declaration had been issued in Hawaii, the Federal Emergency Management Agency (FEMA) was authorized to provide logistics support and handled all aspects of delivery. Ultimately, the system was manufactured and shipped within three weeks, and it arrived at Pali Momi Medical Center on Sept. 29.

While the concentrator was being assembled, the site was prepared. Beams were added for structural support, piping was completed from the emergency oxygen supply connection within a few feet, and the electrical was completed to a disconnect switch also within a few feet.

Because the oxygen concentrator was manufactured elsewhere and shipped to Manitoba for assembly in the ROCS, it couldn't meet the ship date. So, the oxygen concentrator was shipped separately to Hawaii and had to be assembled on-site. This created a challenge because it had to be done on the ground prior to the crane lift.

However, the team was able to install the oxygen concentrator into the ROCS while it was still on the trailer in less than two hours. After only a minor delay for the lift, the project was able to proceed with minimal impact.

The ROCS unit was then lifted into place and connections were made that day. It only took two days of final assembly and testing before the system was ready for operation. The concentrator was installed and fully operational by Oct. 1, which was an incredibly short amount of time, thanks to the extraordinary efforts of everyone involved.

It is amazing how a team comes together in times of crisis. The effort required by the Pali Momi Medical Center staff, the local contractors, the manufacturer, and the support of FEMA and the HI-EMA was nothing less than heroic. To put together a project like that and complete it in less than two months was phenomenal.

### Delivering benefits

As promised, the system produces 600 liters per minute of oxygen, which helped reduce the demand and free up supply



The remote oxygen concentrator system is a completely assembled unit in a 20-foot intermodal shipping container.

PHOTO COURTESY OF PALI MOMI MEDICAL CENTER



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The oxygen concentrator is teamed up with a medical air compressor and a medical vacuum to make up the remote oxygen concentrator system.

for the other hospitals and health care providers in the state. Another benefit is the reduction in operating costs. The project had a benefit-to-cost ratio of 1.58, an internal rate of return of 20%, and a simple payback of 3.9 years with an overall operational cost savings of 53% (daily cost of liquid oxygen versus oxygen concentrator).

During the installation of the ROCS, some performance issues with the existing liquid oxygen system were discovered. Having the ROCS in place allowed for the liquid oxygen system to be shut down and repairs made. This proved the value of having a backup system.

Hospital maintenance staff received training on the system and a daily inspection and checklist was developed. The staff are comfortable monitoring performance and have a basic understanding of system operation, but the local equipment representative has been contracted for preventive maintenance and repair services.

The system is comprised of three components: a medical vacuum pump, a medical air compressor and the oxygen concentrator. Whether or not to outsource service depends on the level of expertise of the hospital's maintenance staff.



RESOURCE



American Society for Health Care Engineering members can access a variety of COVID-19 resources for health care facilities at [ashe.org/COVID19resources](https://ashe.org/COVID19resources).

The subject of maintenance is closely related to the question of redundancy. The ability to take the system offline for maintenance and repairs must be considered. If the oxygen concentrator is the primary source, N+1 redundancy will need to be designed into the system. If it is a hybrid or backup system, the liquid oxygen system provides the needed redundancy.

System performance has been excellent with no failures or glitches up to this point. The only issue is the inability to accurately determine actual usage. Currently, the only way is to calculate based on runtime hours and average flow based on readings from each shift. A mass flow meter is on order to be added to the system, providing for exact measurement.

At the time of this writing, two of the other health care systems in the HISHE group also have installed, or are in the process of installing, oxygen concentrators at Hawaiian health care facilities.

### New and better ways

With pandemics, climate change and other demands on health care organizations today, it is incumbent upon facilities management professionals to look for new and better ways to improve the emergency operations plan and the resiliency of their organizations. Oxygen concentrators should be part of every health care facility's plans, whether they are used as the primary source, emergency backup or a hybrid solution.

For rural and remote locations, utilizing oxygen concentrators as a primary source for oxygen may make the most sense. For other locations, where liquid oxygen is more readily available, utilizing it for redundancy or for emergency backup is still a very good idea. In a disaster, such as an earthquake or tornado, roads may not be accessible. So, having an on-site source of oxygen could prove critical.

In addition to providing a reliable primary or emergency backup source of oxygen, these systems can save money. With all the strains being put on health care organizations to reduce expenses, every health care facility should at least consider it. **HFM**



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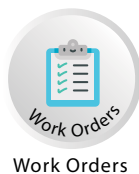
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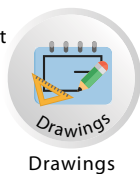
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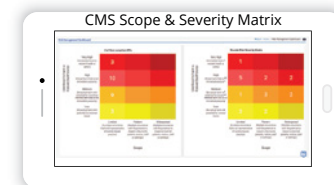
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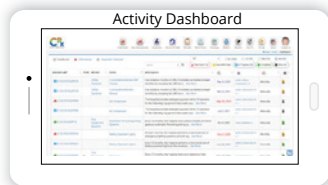
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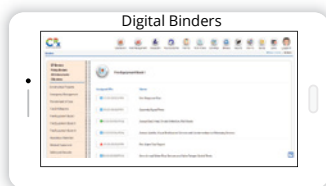
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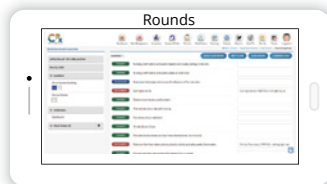
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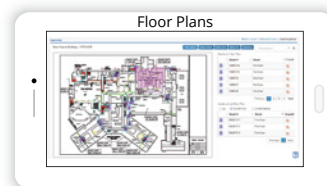
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The Swedish Issaquah Medical Center tenant improvement project included sustainable features such as light-emitting diodes, strategic use of daylighting, sustainable materials and increased occupancy space without increased HVAC requirements.

# Opportunities for hospital sustainability

Three areas for improving design and operations

BY **DALE A. ANDERSON, AIA, LEED AP, EDAC, ACHA, AND DARREN M. SCHWEND, PE, HFDP, LEED AP BD+C**

Hospitals have a great magnitude of activities involving public use, staffing and at-risk individuals that must be considered as part of the operation of the facility — basically, a miniature city. Activities include eating, sleeping, office work, laundry, management and maintenance, and that doesn't account for the higher health care practices of the facility, such as surgeries, imaging, patient care and infection prevention.

Introducing sustainable energy and environmental practices at hospitals is a daunting task, given that hospitals are one of the top energy users in the

building industry. However, the rewards are worth it. Beyond financial advantages and positive impacts on the environment, such actions can ensure hospitals are among the healthiest structures for human occupancy.

## Three opportunities

Building materials, chemical processes, air filtration, energy considerations and staffing levels all have an impact on but are only part of the sustainability equation. Put simply, hospitals and other building types offer three basic categories of opportunities for sustainability, including:

## The importance of resiliency

**1. Materials.** Sustainability in materials comes from several aspects of the materials themselves, including content, manufacturing/delivery and life cycle/recycling. Looking at each from the definitions provided by the U.S. Green Building Council's (USGBC's) LEED v4.1, Building Design + Construction, offers the following summarized descriptions:

- **Content.** The ingredients contained within the building materials, including the raw materials used, where the materials are sourced and their environmental contents (e.g., low-emission components, reduction/elimination of harmful or polluting chemicals).

- **Manufacturing/delivery.** The fabrication processes covering issues of embodied energy, waste gases and byproducts, and the environmental impacts of delivery. If fabrication is distant from the project site, the impacts from delivery must be considered, whether by rail, truck, airplane or other.

- **Life cycle/recycling.** What happens to materials used in the facility once they have completed their normal lifespan and what is done with them next.

In hospitals and other public buildings, good material selection can have a direct impact on other aspects of sustainability, such as indoor air quality and acoustic performance of the functional spaces. Hospitals might also adopt third-party certifications of resources or finished products.

**2. Applications.** How materials are used in construction of the facility itself is tied to the applications. When selecting materials, hospital facility designers and owners face concerns of durability, replacement processes, infection resistance, content and historical performance. The approach will be different between the construction of new, ground-up hospitals, and renovations or expansions of existing facilities.

A new facility will have more opportunities to consider and justify the use of sustainable materials. In existing facilities, the typical concern will be to match the established materials for continuity of look and performance.

Challenging the use of existing materials relates to the selection process when the material was first put into the building. Was any consideration given to aspects of sustainability, or was it a tried-and-true formula proven in the past? Hospital designers should look at how the material has held up for the

**R**ecent wildfires and tornadoes on the West Coast have reinforced the need for resiliency contingency planning and implementation. As the climate changes, health care facility professionals must prepare for the inevitable natural disaster that disrupts operations. Resiliency enhancements also can contribute to sustainability goals.

Hospitals must maintain disaster contingency plans, and it may be time to revisit those plans to ensure they meet the anticipated response. Considerations include the following:

- Accurate contingency planning documents that specify valve locations as well as shutdown and startup procedures that may be required to secure a building for weather, fire or other events.
- Water and waste collection tanks to maintain operation after a service failure.
- Microgrid power systems, which can provide operational confidence during a power failure and cost certainty of energy use during normal operations. Backup power systems are becoming increasingly important due to preventive power blackouts during high winds where the risk of wildfires is significant.
- Backup fuel to maintain kitchen operations to allow the hospital to provide disaster relief at a crucial time. Natural gas-fired cooking equipment can be used with a mixture of air and propane or transitioned to electric cooking equipment.

From the legal perspective, the American Institute of Architects (AIA) Resilience and Adaptation Advisory Group is developing forms addressing these same ideas — resiliency and climate risk — for the design professional to use.

As discussed in the AIA guide, *Hazard and Climate Risk: a user's guide and form for acknowledging risk*, they will assist in working with project owners to identify development of concepts noted above and possible improvements to the structure and site design process.

Likewise, state laws and local building codes receive regular updates directly tied to the health, safety and welfare of the occupants of the structures. Recently, states and local municipalities have begun including language in those updates tied to climate change. Insurance firms also have begun to assess claims made and apply in court cases the need for design professionals to be responding to the world's changes in the environment. ■

original application and evaluate whether it should be used again, even for simple continuity reasons.

A larger consideration relates to the building itself. Is it beyond its life span for its current use, which may be very different from when it was first constructed? Does it meet current building code standards regarding energy, seismic, resilience and other considerations, or should it be demolished and replaced with a new structure? If it's to be demolished, how will the scrap materials be handled? Will they be recycled, refurbished or reformulated into something else?

Today, most organizations are establishing facility standards of design, materials, colors and other factors to illustrate brand identity. These carry demands for material selection that may or may not be influenced by sustainability concerns. Here, again, LEED v4.1 offers guidance, with its category definition related to

"Tenant Design...", primarily for the shell and core features of the building.

Hospital facilities managers understand that materials wear out and need replacement on a regular cycle, and that the original materials often are no longer available. At that point, sustainability can enter the material selection discussion as a priority alongside other determining factors.

**3. Energy management.** New hospitals can reduce energy use from the beginning of design with a holistic approach that includes maximizing the building envelope, utilizing heat recovery systems, setting back or turning off systems when areas are unoccupied, and using renewable energy sources. Low-energy consumption and decarbonization are achievable goals, but success requires dedicated focus throughout design.

Best practices are outlined in publications such as the ASHRAE Advanced



Matching new to existing materials for continuity was a priority during the Swedish Issaquah Medical Center tenant improvement project.

Energy Design Guides; ASHRAE Standard 36, High-Performance Sequences of Operation for HVAC Systems; and USGBC LEED v4.1. Early programs such as Targeting 100 show how to meet the hospital's comfort, infection control and operational needs with reduced energy use.

There can be secondary operational benefits from modern systems that provide energy efficiency. The recent response to COVID-19 and outdoor pollutants such as wildfire smoke required changes to ventilation, air treatment and filtration. Energy-efficient buildings with sophisticated systems were able to make these changes more rapidly with minimal physical disruption.

With the higher ventilation rates required by American National Standards Institute/ASHRAE/American Society for Health Care Engineering Standard 170, Ventilation of Health Care Facilities; and the Facility Guidelines Institute's *Guidelines for Design and Construction of Hospitals*, a typical hospital can find nearly 40% of its energy going to the reheating necessary to maintain comfort. Reheating energy can be reduced by designing a system that allows cooling with a warmer supply air. Reheating with a heat recovery chiller system also can significantly lower total energy use.

Except for small fast-food restaurants and greenhouse-growing facilities, existing hospitals are typically among the most energy-intensive buildings. But even these hospitals have an opportunity to drastically lower energy use by implementing conservation strategies.

Energy conservation strategies are best started by performing an energy audit to document the existing systems, HVAC and lighting control sequences, envelope systems and historical energy consumption meter data. An investment-grade or ASHRAE Level 2 audit will identify opportunities to lower energy, repair deficiencies, improve resiliency and strategize future improvements.

The energy audit will be a first step toward mapping out a sustainability/energy management plan that can then be used to find synergies between capital improvements that also will improve patient care. Energy improvements aligned with patient and staff satisfaction

may have a better chance of approval, as a payback analysis can show how they contribute to staff retention and improved patient outcomes. One example is a control system upgrade from pneumatic controls to digital controls, which allows for real-time visibility from the management

team and faster response to comfort and infection control issues.

Some energy reduction strategies can be achieved simply by reprogramming the building control system for more efficient and intelligent operation. Significant results also can be achieved through commissioning to ensure that existing systems are operating as efficiently as intended. An independent commissioning team or facility staff with the appropriate training and skill set can perform the commissioning. This scenario emphasizes the importance in hospitals of a functioning digital control system operating the mechanical-electrical-plumbing systems.

Preventive maintenance (PM) programs that ensure the building systems are fully operational also contribute to energy efficiency. PMs are much more than filters, belts, bearings and lighting components; they include sensor calibration and cleaning, and an intimate understanding of system function.

Today's building engineers must have sophisticated abilities that are not always easy to find. Competition from high-profit business sectors is not making it easy for hospitals to fill the roles necessary to operate their buildings, but resources spent here can have payback in energy reduction.

Some facilities have created a new role of energy manager to implement and maintain an energy management plan (EMP). In fact, Washington state's new clean buildings law requires facilities greater than 50,000 square feet in area to implement an EMP as early as 2026.

### Real-world example

As one of the largest health care providers in the Pacific Northwest, Providence has committed to environmental stewardship in its development activities, according to Geoff Glass, PE, CEM, senior manager for energy and sustainability, and Erin Couch, AIA, architectural standards and design director.

From materials standardizations to participating in design for energy management, Providence is engaged for each facility. A few examples include:

- Emissions reduction using the acronym WE ACT (waste, energy/water, agriculture/food, chemicals and transportation).
- Health and resilience by helping to build climate resilience in the communities Providence serves.

### ABOUT THIS ARTICLE

This feature is one of a series of articles published by *Health Facilities Management* (HFMmagazine.com) in partnership with the American College of Healthcare Architects (healtharchitects.org).







WASTE

ENERGY & WATER

AGRICULTURE & FOOD

CHEMICALS

TRANSPORTATION

Providence's "WE ACT" emissions-reduction acronym appears on many of its materials.

• Commitment and engagement through alignment with Providence's mission and core values, education and communication.

A 2017-2019 tenant improvement project designed by DLR Group | Salus and P2S Inc. at the Providence-affiliated Swedish Issaquah Medical Center in Washington illustrated the complexities of working in a highly energy-efficient facility — even one that is now 10 years old.

The project completed two final shelled floors to provide new intensive care beds and medical specialty beds (a combination of psych and medical-surgical). Materials used when constructed were state-of-the-art and highly appealing aesthetically. Matching the existing materials with the new patient units would be difficult and needed to be cost-effective.

The hospital is an acute care facility that is also an excellent example of energy efficiency and the ventilation systems had to meet and integrate with their energy reduction strategies and systems. For example, the variable air volume terminal reheat units were sized for low water temperatures to maximize the functionality of the heat recovery chiller, in some cases requiring oversized three-row coils.

The facilities management team needed to be very familiar with the control system to integrate the new equipment into its temperature reset and control algorithms. The team worked closely with the design and construction team to ensure that the systems operated as intended after the additional floors were completed and commissioned. That commitment has enabled Swedish Issaquah

to reduce energy intensity by nearly 15% to a level near 100 kilo-British thermal units per square foot per year.

Constant improvement is possible when a health care facility energy manager is very involved with operations and preventive maintenance. Meeting the goals of carbon reduction, zero-carbon or low-energy consumption requires a team response that includes facility managers, energy managers, engineers, architects and contractors committed to the lowest possible energy use.

Providence is already active along this path by measuring the results of these actions starting in 2020. With both a published "Providence's Climate Action

Plan" and a design materials standard called "PSJH-REH-1008 Environmentally Preferable Purchasing," Providence has shown the possibilities of a commitment to healthier hospital facilities and a public partnership for sustainability.

"We are proud of this work and committed

to creating and supporting healthy communities wherever we serve," states Rod Hochman, M.D., Providence's CEO and president, on the system's website. "I hope you will join me in supporting our efforts and doing what you can to drive down our own pollution, as together, we build Health for a Better World."

### Best opportunity

Because of the unique nature of their use, hospitals and other health care projects bring many considerations beyond those of a typical commercial building. Factors having a higher degree of need (e.g., increased design/functional

flexibility, indoor air quality, energy use) may require extended reviews prior to selection.

Funding for facilities is difficult to get and faces a tremendous amount of competition for how to use it. Trying to find solutions that can blend energy reduction with other benefits may be the best opportunity to share the available dollars.

Introducing sustainable practices to large, energy-intensive hospitals is a complicated task but one that can reap significant energy reductions. Much depends on whether the project is a new building or a renovation/addition to an existing building. Many aspects, such as transportation factors, habitat protection, and availability of energy and water sources, relate primarily to new project developments.

While there are other sustainability factors to be considered for a facility, some may not lend themselves easily to use in any specific project. For example, aspects such as site selection and location, transportation availability, habitat protection, and availability of energy and water sources, are related to a new project development.

As noted, however, many health care facilities are well down the path of developing their own sustainability standards and creating some type of environmental policy in their communities. Those looking to start a dialogue with their hospital should look first into the steps they've already taken. **HFM**



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**RESOURCE**

American Society for Health Care Engineering (ASHE) members can access the monograph "ASHE Sustainability Guide" by logging on to [ashe.org/sustainabilityguide](http://ashe.org/sustainabilityguide).



# Health care furnishings to meet any challenge

Vendors offer comfort, flexibility, sustainability, cleanability and more

**M**anufacturers of hospital furnishings are meeting the needs of health care providers by focusing on ergonomics, cleanability, aesthetics and customization in their latest offerings. Modular furnishings that offer flexible connections and arrangements are especially popular. This includes multi-use seating choices with safety, comfort and the ability to improve the patient experience being top priorities.

The latest furnishing innovations offer comfort and ease of use for patients and caregivers; furniture that fits into smaller footprints and offers greater functionality; a more hospitality style; a lighter look and feel; and the use of environmentally friendly materials. Because of the COVID-19 pandemic, cleanability of furnishings also has taken on greater importance.

"Hospitals are asking us to focus on more metal versus wood materials for infection control, durability and bariatric needs," says Pam Krill, director of product marketing at Steelcase Health, Grand Rapids, Mich. "There also is a focus on a greater variety of finishes and colors for a warmer, more welcoming aesthetic. And exploring more capabilities in upholstery using silicone and vinyl without phthalates for cleanability, durability and infection prevention are top of mind."

## Furnishings trends

Due to infection control measures that involve increased cleaning protocols, more hospitals are requesting non-woven fabric, says Jessica Mathieson, vice president and general manager of acute care at Stryker, Kalamazoo, Mich. "Historically, woven fabrics have been used on the backs of chairs in waiting rooms or lounge areas. With the need for increased cleaning and disinfecting of all areas, hospitals are now choosing all-coated fabrics and, specifically, vinyl because it withstands rigorous cleaning procedures better than other coated fabrics."

**SIT BACK** // Empath recliner seating adapts to a wide range of uses in clinical spaces, including patient and exam rooms and infusion spaces. **Steelcase Health**

The emergence of COVID-19 has affected many furniture design issues, agrees Michelle Ossmann, director of knowledge and innovation for health care at Herman Miller, Zeeland, Mich. "For example, we've long known that people are generally disinclined to sit next to strangers, but the need for seating density in waiting spaces drove furniture layouts with tight seating arrangements. COVID-19 and the need for patient distancing upended these dense seating layouts, giving people space they originally wanted, yet now need for safety."

How hospital furnishings are designed often dictates how they can help hospitals meet infection prevention protocols. Furnishings designed specifically for clinical environments typically can withstand the rigors of daily use that are unique to that environment. "But what's often missing are design elements that can play a part in infection prevention," says Brian Hazelwood, marketing manager at Midmark, Dayton, Ohio. "For instance, cabinetry that features Environmental Protection Agency-registered antimicrobial pulls, nonporous surfaces that are

**GOING HOME //** The Unity glider and chaise lounge sleeper fuse the comfort of home with the durability and cleanability that caregivers expect. **Stryker**



**TRIPLE THREAT //** The Spry seating collection, a group of chairs and tables, emphasizes flexibility, cleanability and durability. **Stance Healthcare**



**CLEAN CABINETRY //** Synthesis wall-hung cabinets simplify cleaning and help maintain a clean, aseptic environment for patients and staff. **Midmark**

**FLEXIBLE FURNISHING //** MyPlace high-back seating and lounge furniture feature a modular design, which allows pieces to be added and removed as needs change. **KI**



**REST AND RECOVER //** The Alô recovery recliner has a lot of the same acute functionality built into it as the treatment height product, but it features a lower seat height. **Champion Manufacturing Inc.**

self-sanitizing, and seamless upholstery that is easier to clean and disinfect.”

Ergonomics continues to be a critical issue for hospital furnishing providers, especially as it relates to people interacting with technology. In fact, caregivers in hospitals spend approximately half of their shifts using technology, says Steven Bramson, president at Innovative Ergonomic Solutions, Easton, Pa. “Providing portable and adjustable solutions such as a workstation on wheels creates better conditions. When a caregiver can effortlessly interact with the patient, and not have to worry or struggle with the technology or the furniture, it results in a higher level of care.”

Furnishing styles are moving rapidly toward a more inviting residential feel, says Suzanne Fawley, behavioral health interior designer at Stance Healthcare, Kitchener, Ontario. “Seating products for persons of size, formerly called bariatrics, are now included in furniture collections — instead of ‘one-off’ pieces to accommodate that need — and thus lead to a more dignified patient experience. Also, many of these seating collections

can be built to suit the needs of behavioral health environments, where preventing self-harm and harm to others and maximizing durability are a prime focus.”

Home care is a growing trend as health care providers explore options to treat patients at home to reduce costs associated with brick-and-mortar facilities. This presents new opportunities for furniture manufacturers to develop home care options that help support these patients, says Darryl Metheny, regional sales director at Champion Manufacturing Inc., Elkhart, Ind.

“An example may be a recliner that allows patients to receive intravenous therapies for oncology or dialysis while at home, and provides proper positioning and comfort for longer periods of time,” Metheny says. “Partnerships will need to be forged between service providers and manufacturers to develop ways to cost-effectively deploy these types of products.”

### Seating features

Many furnishings introduced to the health care market incorporate modular, building-block features. For example,

Allseating, Mississauga, Ontario, has introduced the Rûhe collection, which is comprised of single seating (guest, patient and lounge), tandem seating and tables. Guest seating includes a standard seat size, and a plus or love seat to accommodate a broad range of body types. Rûhe’s 14-gauge steel frame features seven support ladders and 10 arm variations that contribute to 15 standard seating configurations and numerous possibilities with linking tables and mid-arms. The collection is designed to create cohesiveness throughout waiting, lounge and patient rooms.

The Alô recliner from Champion offers many customizable elements. It is available in two working heights (treatment or recovery), and users can select different back styles, vanity panels, tables and premium coverings. Patient empowerment items such as powered recline, a USB port and heat/massage can be added. Clinical functionality also has been engineered into the Alô, which includes swing-away arms and a removable seat for ease of cleaning and disinfection, the Trendelenburg position for acute





**CARE CONTINUUM** // The Cama Care Chair helps transition bedside to chairside care in a way that lowers length of stay and improves patient mobility after treatment. **Cama Collection LLC**



**ADAPTABLE ANSWER** // The M Quad workstation easily adapts to technology while meeting health care providers' ergonomic needs. **HAT Healthcare**

**PATIENT SUPPORT** // The Modena patient chair and ottoman is designed for patients seeking a comfortable, supportive seat during recovery. **Kwalu**



**SEATING SELECTION** // The R  he collection is comprised of single seating (guest, patient and lounge), tandem seating and tables. **Allseating**



**TEAMWORK** // The Commend nurses' station functions as a set of building blocks for creating different team spaces while maintaining aesthetic cohesion across facilities. **Herman Miller**

reactions, and 4-inch twin-wheel casters, retractable foot trays and push handles for patient transport.

MyPlace high-back seating from KI, Green Bay, Wis., is designed for a wide range of gathering areas, from small touchdown nooks to lobbies to caf   environments. "MyPlace high-back seating integrates power management into its design and is durable with a 400-pound weight rating. Its modular design allows pieces to be added and removed as needs change," says Jonathan Webb, workplace market director.

Stance Healthcare, Kitchener, Ontario, which focuses on the behavioral health design space, has released its Spry seating collection, a group of seating and tables that emphasizes flexibility, cleanability and durability. Featuring solid surface arm caps, Spry offers 360-degree cleanout for maximum infection control, and coordinates with linking tables to create space between users.

Steelcase Health offers Empath recliner seating, which adapts to a wide range of uses in clinical spaces, including patient and exam rooms and infusion spaces. "Empath features are designed from real-world

insights to improve the patient experience through safety and comfort while promoting overall quality of care," Krill says. "Empath adheres to stringent Steelcase standards for durability and performance, with a thorough static and dynamic testing process that exceeds industry standards to ensure a long product lifespan."

Kwalu, Atlanta, has introduced the Modena patient chair and ottoman for patients seeking a comfortable, supportive seat as they recover in their hospital rooms. The ottoman is designed to coordinate with and easily store under the patient chair, taking nothing from the room footprint. The frames of the chair and ottoman are durable, bleach-cleanable and contain a steel-reinforced joint system. The frames are not wood, but

wood's warmth and elegance has been reimaged into Kwalu's long-lasting finish, the company states.

Cama Collection LLC, New Haven, Conn., has introduced the Cama Care Chair, a new addition to its IOA Cama Collection.

"With the knowledge gained in our investigation of 'purposeful sitting,' this chair addresses sleep and stability, care and

comfort, memory and motion, exercise and engagement, and love and support," says Rosalyn Cama, president. "As bed rest is deeply rooted in hospital culture, this chair helps to transition bedside to chairside care in a way that lowers length of stay and improves patient mobility after treatment."

Stryker has unveiled its Unity furniture line, which can withstand the intensive cleaning procedures associated with today's infection control requirements. Unity has open-slat design and 360-degree cleanout spaces to prevent particles from getting stuck in crevices. The sleepers have a moisture-barrier surface to protect the durability of the product while withstanding cleaning protocols. "Unity offers features such as a waterfall front design, sealed seams, removal of exposed wood, nonporous self-skinned urethane arm caps and high-density Ultracell foam," says Mathieson.

### Casework options

Herman Miller's Commend nurses' station combines the benefits of prefabricated with the beauty of millwork, according to Ossmann. "With Commend, we set out to create the most beautiful prefabricated

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solution possible. Its modular design is sleek and linear, and functions as a set of building blocks for creating different team spaces while maintaining aesthetic cohesion across facilities." Commend was designed with protective details to increase its longevity. Corner protectors shield corners from dents and marks, and materials such as Corian cladding and stainless-steel toe-kick panels increase its durability. Additionally, damaged components can be easily replaced.

HAT Healthcare, part of Innovative Ergonomic Solutions, offers a selection of mobile workstations that are configurable and durable. "The workstations feature vertical height adjustability and can be configured to be powered or nonpowered, allowing caregivers and information technology departments to meet the needs of the workspace," Bramson says.

Midmark has introduced Synthesis wall-hung cabinetry and a mobile procedure cart. The cabinetry is designed to improve ergonomic reach and visibility

while enhancing storage efficiency and supporting infection prevention. Primary features include lower upper height and thinner depth of cabinets to improve access to storage with less reach and lean required, and the use of gravity-fed, angled flow-shelving to improve visibility and access to supplies.

Available in three models, the Midmark mobile procedure cart is designed to support health care-related procedural work from a standing position. Features include a no-tip base design and a slide-out work surface that offers an additional working area. "Thanks to a number of optional features, including storage racks and mounting accessories, caregivers have the ability to design the cart to work the way they need it to work," according to Hazelwood.

#### Advances ahead

For the future, sensors and smart technology will assist the eyes and ears of the caregiver, sending alerts and just-in-time

diagnostics for care and safety interventions, predicts Cama. "Many nonmedical devices are already care-capable; we will see these technological advances being adopted into hospital furnishings soon. Transportation seating has already adopted these smart features."

Webb says another advance will occur in virtual care practices. "Furniture manufacturers should look to integrate technology into more of their products to accommodate comfortable and flexible virtual care settings."

Modularity will continue to grow in importance, says Ossmann. "Planning with modular casework and furnishings allows hospitals to properly handle ever-evolving situations and alleviate the stress that fixed, singular-use products and design often can cause during transitions." **HFM**



**Neal Lorenzi** is a Mundelein, Ill.-based contributor to *Health Facilities Management*.



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# Building hospitals in the pandemic era

## Lessons in flexibility and technology learned during COVID-19

**T**he COVID-19 pandemic has been a major economic and social disruptor, and hospitals have not been spared from this turmoil. People want to stay out of hospitals now more than ever. If they need to be on-site for any reason, they want to feel safe, know they will receive high-quality care and go home in better shape than when they arrived.

As the world continues to learn more about COVID-19 and update processes and procedures to accommodate the changing environment, there is a need to design and construct new spaces and facilities that are as well-equipped as possible for future pandemics.

### Flexible plans

The longer COVID-19 sticks around, the more it is viewed as an issue that must be continuously considered. While the hospitalization rate for COVID-19 patients rises and falls, other health care needs remain. Hospitals cannot afford to shut down operations because they need to be available for their communities. They must find ways to flex up to manage patient surges and operationalize these spaces when they aren't serving COVID-19 patients.

Patient transfers from lower-level facilities have been challenging, as many rural or less-populated areas have been hit hard and beds are scarce for transfers of all conditions. Some rural hospitals even had to close due to challenging financial circumstances and the inability to attract staff and physicians.

Many are predicting a rise in the acuity of incoming hospital patients. To adapt to this landscape, hospitals are building more flexible intensive care unit (ICU) space, allowing the units to be used for all types of patients with the ability to flex up to an ICU level of care when



Planning, design and construction challenges during the COVID-19 pandemic have been extensive.

needed. These units are less efficient from a space perspective and require more expensive infrastructure to support them.

Their HVAC systems require additional air changes, flows and filtration when they are flexed up to be used as ICUs. Staffing shortages and turnover may make it a challenge to keep track of adjusting these spaces back to normal operating procedures when not in use as an ICU. There also is an increased emergency power requirement for the additional equipment needed to care for patients in these spaces.

Patient spaces are being designed to separate COVID-19 patients from the rest of the hospital population. This can add significant space needed to accommodate separate waiting areas, additional donning and doffing stations for personal protective equipment (PPE), and anterooms.

Some of this has been managed during the current pandemic by adjusting entire units to solely serve COVID-19 patients. However, this approach may not be sufficient for future pandemics.

Facilities also installed equipment at the beginning of the pandemic that was

intended to be temporary. Many hospitals are consequently looking at making these solutions permanent for future flexibility. While it's not known what the next pandemic may bring, providing flexibility and infrastructure to support occupants during the next one can be valuable.

Many hospitals are facing not only the challenge of an influx of patients, but also the rising costs to build new or modify their existing spaces. Construction costs have gone up significantly since the pandemic began, and lead times have increased substantially, making the process much less predictable and extending general conditions costs. Hospitals have been forced to keep as many beds operational as possible, in some instances increasing the number of phases in a project or delaying projects to simply allow the rooms to remain occupied.

As future pandemics arise, hospital partnerships with staffing companies, vendors and manufacturers, as well as the architectural, engineering and construction community, will continue to be important because these counterparts can help secure access to equipment



and supplies, and leverage regional and national partners for other support.

The cost of construction is one factor; however, COVID-19's operational impacts also are increasing the cost to operate facilities. There's added square footage, fewer patients per unit, and more staff and visitor space, coupled with more air changes, increased airflows, additional filter changes and fewer equipment setbacks. This all adds up to more energy usage.

While many health systems have attempted to reduce their energy usage, the measures taken during the current pandemic have moved the dial in the opposite direction. Facility operators are pushing equipment to its maximum in some cases to achieve the needed airflows, thus using more energy, requiring more frequent maintenance and possibly shortening the equipment's lifespan.

In the future, hospital designs need to adapt to be as efficient as possible while allowing for adjustments in times of need. Flexibility of building systems to operate independently may be more important than ever, in addition to separating units and rooms from each other. Access to the systems for maintenance without having to go into patient care areas could also be vital when maintaining buildings during a pandemic. Staffing challenges continue to be a hurdle, so finding the most efficient way to staff these facilities is a key factor in design.

Providing care to patients in these environments is intense, and as units get larger, the effort required to move from one space to the next increases. Finding solutions to minimize the steps and time needed for such tasks is crucial. Furthermore, clinicians need spaces to take breaks from the demands of work while social distancing from others. The small break rooms of the past may not support these needs going forward, which also may decrease the overall efficiency of these spaces. On-site dining, coffee shops and other places to fully disconnect from care units are important for the well-being of caregivers.

Easing maintenance and cleaning within these spaces can help reduce staffing needs as well as the risk of infection. Cleanable surfaces are more important than ever when ramping up safety

## Suggested changes for PDC projects during a pandemic

It has been challenging to keep planning, design and construction projects on track during the COVID-19 pandemic. Many projects were shut down or put on hold at the beginning of the pandemic, with many eventually resuming and taking advantage of various virtual communication tools, including remote web meetings and virtual walk-throughs.

Staggered in-person site visits and walk-throughs to allow for social distancing and appropriate personal protective equipment (PPE) also have been widely adopted. While these tools, processes and procedures have had varying levels of success, many hospital professionals still see areas for improvement. Some of the following changes may be implemented for future pandemics:

- While virtual meeting technology has allowed out-of-town or off-site personnel to attend, some of the impromptu idea generation that occurs in in-person meetings has been lost. It may be prudent to find appropriate or alternate ways to stage some meetings or gatherings in person, as allowed with applicable PPE.
- Due to patient surges and staffing shortages, hospital personnel needing to attend design meetings are unable because they are occupied with helping patients or providing additional support to colleagues. It may be prudent to stage or schedule meetings at various times throughout the day to give these individuals more flexibility to attend.
- While there are many web-based tools for virtual meetings and for reviewing plans, there are limited capabilities for multiple users to take control of an application (e.g., to point out a change that is needed and potentially draw it on screen rather than verbally describing it). Hopefully, technology partners will devise solutions to address items like this. ■

protocols. If surface transmission is part of a future pandemic, this will especially hold true. Many facilities have removed carpet and surfaces that are hard to clean to ensure their environmental services departments are able to turn over rooms and clean all public spaces as efficiently and safely as possible.

Replacing old fixtures with touchless fixtures also can reduce the risks. Touchless automatic door operators are being widely installed to further limit direct contact with surfaces, thus reducing cleaning needs. Longer-lasting products that will hold up over time should be used as construction costs increase and the ability to get into patient areas to replace products becomes more challenging. Many durable items had previously been removed from projects due to cost concerns. Facilities should reconsider this approach moving forward.

### Technology interactions

Smart rooms, telemedicine integration and virtual care all have found their way

into hospitals. These innovations can help improve patient outcomes by reducing staffing needs and potential exposure to infectious diseases (through less people on-site), as well as reducing PPE needs and usage.

Units are being designed and built to offer a mix of nurses taking care of patients both on-site and virtually, allowing staffing ratios to be increased and requiring less in-person staff. There is a balance between on-site needs and the services that can be provided virtually, but this shift has allowed additional flexibility and a more interactive experience for some patients.

Imagine a patient who is too sick to get out of bed to turn on the light or adjust the thermostat in their room. A virtual nurse can assist with these tasks if the room is set up to have those devices controlled remotely. They often can adjust TV stations, order food, assist with education or connect patients with a family member. Clinically, virtual nurses can monitor vital signs and other functions, minimizing potential exposures and enhancing the patient experience. These capabilities

### ABOUT THIS ARTICLE

This is one of a series of monthly articles submitted by members of the American Society for Health Care Engineering's member tools task force.

are being expanded to other environments, such as the patient's home, as technology allows for reliable monitoring and preventive checks that used to be accomplished only from a hospital bed.

Such advancements, along with the rising desire of patients to bring their own entertainment devices during hospital stays, adds stress to information technology (IT) infrastructure. While networks must remain protected, allowing patients and visitors to stream their own entertainment is a major patient satisfier. Additional design and construction efforts are needed to accommodate streaming and integrate it properly without overburdening IT networks. A long-term master plan for hospital infrastructure can help provide clarity and upfront planning to support future needs.

Medical records are being integrated much better with patient monitoring, allowing caregivers to take care of patients virtually much more effectively than in the past. However, this model still impacts physical space needs. When physicians are taking care of patients

virtually, they need different spaces and technology than they traditionally have worked with. They need spaces where they can be on camera and interact without distractions.

They also may need spaces where they are able to collaborate with other specialists and care team members to ensure they implement the most appropriate care plans. Will these spaces work best if they are on hospital campuses where care teams also provide care to patients in person? Or is it better to be 100% remote? Multiple care methods currently are being tested, and the best option will likely be some combination of both. Additionally, future pandemics will play a role in determining how these models and their physical space needs adjust.

As virtual care becomes more commonplace, technology adoption among patients may differ, and the technology needed to transmit their vitals to care teams may vary. Additionally, Wi-Fi and connectivity required for virtual care and new technologies will be variable across different areas and demographics.

Technologies such as wearable devices, which are being utilized more and more by the public, are continually improving their capabilities. However, they aren't as accurate as the medical devices used to measure the same functions yet. But, as capabilities improve, the field will have to figure out how to equitably distribute these devices and teach patients how to use them. Training and testing will be a large component of this next stage of at-home virtual care, but the shift will likely have an impact on physical facilities and future care models.

Many procedures are being shifted from large hospital operating rooms to more convenient and efficient ambulatory surgery centers (ASCs). Patients often can access these stand-alone facilities closer to home, which can be more favorable than navigating large hospitals when undergoing routine procedures that don't necessarily require the infrastructure provided at larger facilities.

ASCs often incorporate clinical services and rehab into their models, integrating the care for those that fit this setting.

ASCs also may allow routine procedures for noninfectious patients, secluding infectious patients within hospitals. As a result, ASCs help allow hospital space for the most complex cases, allowing more efficient staffing and bed utilization. It will be important to maintain this care option during any future pandemics.

An often important part of the healing process is the in-person connection that patients have with their loved ones, especially during hospital stays. Therefore,

one of the most challenging changes during this pandemic has been the limitation of visitors.

Patients and visitors alike have struggled with not being able to accompany friends and loved ones to hospitals. Patients early in the pandemic were limited to interacting with caregivers adorned


with full hazmat PPE as they lay there confused and yearning to see or talk to a familiar face. While this is a drastic example, it encapsulates the reality of this health crisis.

Electronic and other interactions have been used to address this. However, people often struggle to coordinate and synchronize connections when patients are awake or in a position to interact. It will be important to find ways to better accommodate these interactions to improve the healing environment.

### Extensive challenges

The challenges for planning, design and construction during a pandemic can be extensive. While the circumstances may change during future pandemics, it will be important to be flexible to adjust to the ever-changing environment and work together as a cohesive team to provide the appropriate level of care for patients. **HFM**

**ASHE** RESOURCE

 American Society for Health Care Engineering members can access the report "The Pandemic-Resilient Hospital: How Design Can Help Facilities Stay Operational and Safe" by logging on to [ashe.org/pandemic-resilient-hospital](https://ashe.org/pandemic-resilient-hospital).

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# Playing a key role in project planning

## The EVS leader's crucial function in hospital design and construction

**E**nvironmental services (EVS) departments play a crucial role in the health care setting. More than emptying trash or mopping floors, EVS is the first line of defense in breaking the chain of infection.

Most health care facilities, whether they're hospitals or clinics, struggle with space, leading to never-ending renovations and expansions. EVS leaders find the increased amount of these expansions have a direct impact on the EVS department's day-to-day operations.

It's more than the square footage and number of full-time equivalent employees it's going to take to clean the new area. Considerations must be made from the inception of the design to the ordering and selection of the finishes, flooring and equipment. To manage this process, it's crucial for EVS leaders to play a key role in project design and construction.

### Design considerations

EVS leaders should be sure the needs of EVS have been addressed during the design phase of a project. Did the project team include an EVS closet with floor sink, chemical dispenser, shelving and outlets? Can the space accommodate the many different products EVS departments will be required to support as new technology is adopted? So many things must be considered to allow EVS to function properly in the new area, from lighting to access to electrical outlets. Key areas include the following:

**Room design.** From ceiling types in the operating room (OR) to the flooring in patient rooms, all design elements need to be reviewed and selected by key stakeholders, including the EVS department. For instance, EVS leaders need to inspect casework and make sure dust ledges don't have corner pockets that attract dirt and debris, and allow children to stuff papers in them. Similarly, window



EVS representation on a cohesive project team helps ensure contractors have clear expectations for their role in cleanliness.

coverings and frosted glass also affect the department's ability to perform efficiently.

It also is imperative for EVS leaders to look at the lighting manufacturer's specs for cleaning, especially in the OR areas. If the lights are being placed on timers, EVS leaders must make sure the project team has reviewed the hours the EVS staff will be working in the area to ensure the EVS team isn't cleaning in the shadows or the dark.

Technology is continuously being added to patient rooms, ORs and even waiting areas. Electronic kiosks used for checking in, iPads in the patient rooms and many other pieces of technology will need to be wiped down multiple times a

day. This requires reviewing the impact to the EVS department's workflow.

Patient restrooms have a huge impact on EVS teams. In certain areas of the hospital, for instance, they may have whirlpool tubs, requiring proper cleaning of the jets to guarantee microorganisms aren't left behind for the next patient. Dark grout in the restroom or double-paned windows that are unsealed and dirty on the inside will affect a facility's Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score. Other elements to be considered in room design include cubical curtains, furniture and even the type of linen used in making the beds.

**Flooring.** Flooring plays a large role in the healing environment, with selection considerations including colors, patterns, noise reduction and room presentation. EVS leaders must help plan for flooring in entrances, clinics, corridors, emergency departments, ORs, nurses stations, treatment areas, patient rooms and cafeterias, among others.

EVS leaders must make sure they've identified the various types of floors within a facility's design. Reviewing the corresponding flooring spec sheets guarantees proper selection and care of the floor. Whether a project will have brand-new floors or — as is the case with many renovations — a mix of old and new, dirt and bacteria can find their way into corners, doorjams, cracks and dents, becoming more and more difficult to remove.

Depending on the age of the hospital or clinic, EVS teams may encounter several types of flooring. These include linoleum and vinyl composition tile (VCT), luxury vinyl tile (LVT), bio-based tile and sheet tile flooring made from low-volatile organic compound material, as well as terrazzo in entrances and other public areas.

Identifying high-traffic areas such as corridors and public spaces will influence the type of flooring chosen during design review. In these areas, the flooring must be slip resistant, reasonably easy to clean, durable and long lasting, and available in a variety of textures and colors. It also should be water and stain resistant.

VCT and sheet vinyl have been mainstays in these areas for economic reasons. However, their maintenance needs should be considered by EVS leaders. VCT requires high maintenance and can be labor intensive, with auto-scrubbing, stripping and waxing as part of its routine. Rubber and sheet vinyl are usually flash-coved and easier to maintain.

Terrazzo floors are durable enough to withstand heavy foot traffic, can last for decades and require minimal maintenance. LVT is another sought-after flooring in the care environment. It holds up with rolling loads (e.g., pallet jacks, wheelchairs and patient beds) and is accessible to those with disabilities. Additionally, LVT design choices have evolved to provide a pleasant aesthetic.

When determining the type of flooring to install, it is important for EVS leaders

## Getting a seat at the PDC table

**D**eveloping a great partnership with the facilities department and infection prevention professionals is a key strategy for environmental services (EVS) leaders seeking to advocate for their cause during a planning, design and construction (PDC) project. Sitting down with organizational peers to explain why the EVS department needs to be involved is a sure way to get a seat at the table.

EVS brings value to the PDC table. As discussed in the accompanying article, there are a variety of tasks for which EVS leaders will serve as the gatekeeper and representative. These include, but are not limited to, the identification of unintended warranty violations and potential infectious cross-contamination situations. Many of these issues are identified when the EVS team is given the opportunity to chime in on design features that may create improper cleaning constraints.

The PDC team typically has representatives from the clinical team, administrators, architects, contractors, infection prevention, facilities and, at times, even the doctors working in the affected areas, which gives a cohesive representation of the competing priorities. These priorities include aesthetics, comfort, medical efficiency, infection prevention and cost control. EVS most likely already interacts with these groups on some level, but being part of the PDC decision tree solidifies the needs of EVS being considered.

A cohesive team ensures the group holds the contractors accountable and clear expectations are set regarding their role in cleanliness. For example, having the contractor using walk-off mats outside the containment area prevents construction dust being tracked through the facility, thus allowing EVS to maintain the cleanliness of the facility during construction. Contractors should be informed they are responsible for completing a "construction clean" prior to turning the project over to the facility. The relationship with the contractor and subcontractor is just as important as it is with the rest of the team members.

When EVS is an active participant in the development of the plan, the smallest things having the biggest impact on EVS and the facility can be resolved in an easy and timely manner. One of the greatest results of bringing a multidisciplinary team together is a clear understanding of each other's priorities. However, EVS leaders shouldn't wait for an invitation; they need to invite themselves. They must be present to advocate for the needs of the EVS department during a PDC meeting, shining a light on the department's requirements. ■

to know that grout is porous by nature unless it is properly sealed. Tile and grout surfaces require more than just the initial sealing. The floors should be evaluated not only after installation, but again after rigorous cleaning.

Grout lines often get darker over time, giving the appearance the floor is dirty even when it is clean. This perception of unsanitary conditions, especially in a patient room or public restrooms, can be reflected in a health care organization's HCAHPS scores. Additionally, studies have found that some floors in patient rooms are hosts to bacteria, including vancomycin-resistant Enterococci and methicillin-resistant *Staphylococcus aureus*.

**Equipment.** Once the design review is completed and approved by all — including EVS leadership — identifying the equipment that will be going in these rooms is critical. Equipment must be identified as remaining in the room (a room fixture) or a mobile piece of equipment to be in the room only while in use.

Not all equipment holds up well to the intense cleaning that is required, sometimes hourly in the case of a pandemic. The manufacturer-recommended cleaning solution will need to be reviewed. This will ensure that the EVS team doesn't void the warranty on the equipment. There is a chance that the disinfectant required to maintain the equipment isn't used by a particular organization. In such

cases, EVS leaders need to review the process of bringing on this solution. As a key stakeholder, the EVS leader may want to explore the other equipment options, especially if the solution to properly disinfect it isn't readily available.

If there are no alternatives or the equipment is chosen despite concerns, contacting the manufacturer would be the next step to get a letter authorizing that the disinfectant currently used by EVS won't void the warranty. EVS leaders likely will need an infection prevention professional's approval to bring in any new disinfectant, so the EVS team should be prepared to present safety data sheets, dwell times, kill claims and Environmental Protection Agency registration. It also is important to ensure a proper timeline to secure ample supply of the product and training.

Furniture took a real hit with the pandemic and the increased cleaning protocols. In many facilities, day-to-day disinfectant took a toll on wood, plastics and electronic screens. Many screen cleaners had no kill claims, which became problematic for some.

Educating the project team on the need for bleach in C. difficile rooms helps to determine if the equipment will remain in the patient

room or be removed after each use. Past the construction phase, it's important to work with infection prevention professionals and the EVS department manager to designate who will be responsible for cleaning the new equipment.

### Construction considerations

Beyond participation in formal design and construction processes, EVS leaders also must contend with more chaotic and unpredictable renovation and addition projects, such as revamping areas to add an office or taking down a wall to provide additional patient care services.

These active construction projects are usually on a very short schedule, with no additional time to allow for proper cleaning and disinfecting. In fact, EVS is often the last to know about renovation projects and their timelines. There have been times when an EVS leader will

receive a call on a Friday afternoon letting them know that construction work will be done in an area over the weekend that will require a terminal cleaning on Sunday night. Several of these areas are typically serviced Monday through Friday and/or on another shift, leaving the EVS teams scrambling to figure out how to get it done at the last minute.

During renovations and additions, EVS is not only impacted by the final cleaning timeline, but also may become collateral damage to these changes. As square footage is added, the EVS requirements to maintain this new space often are forgotten. Additionally, the design team may demolish an existing EVS closet during the renovation, not realizing the reason it was there in the first place.

Such changes can cause the EVS team to trek across the hospital or clinic to get their carts and supplies. The additional transit time and disruption in

workflow has the potential to increase patient wait times for room turnover, which then becomes a patient and staff dissatisfier.

Beyond that, more square footage usually comes with additional restrooms, trash receptacles and beds, creating increased cleaning requests for daily cleaning and room turnovers.

Depending on the size of the renovation or addition, EVS leaders may need to request more resources, including staff and equipment. The staff to properly maintain these areas must be addressed early in the project to allow time for approvals, hiring and training.

Once construction nears completion, EVS leaders must determine who will be conducting the post-construction cleaning. Will it be contracted out, or is the EVS team expected to complete it? If the EVS team is designated to conduct the post-construction cleaning, the information is often relayed late to EVS, creating staffing crunches to complete the work without delay to the project.

This is yet another example of why EVS leaders need to be in the project meetings. They will be able to ensure time has been allotted for EVS to complete the final cleaning and room setup

prior to the established go-live date. During construction projects, EVS leaders are rarely asked how much time they need and, consequently, they all have felt the time crunch and pain points of the last-minute scramble.

Hands-on involvement in the construction phase ensures EVS leaders can walk the area to know the time, staff and equipment needed to complete a task. Having early information regarding the expected go-live date gives EVS leaders time to schedule a team versus scrambling to find staff to complete the EVS role. For example, if it's a patient room, the EVS leader can designate early on who will be moving the bed, overbed table and nightstand, making the whole transition much smoother.

Little things that are needed to fully complete the project prior to the space being ready for occupancy, such as hanging the curtains, stocking paper products and filling soap dispensers, all support the perception of the project as a success. Working through a punch list prior to signing off on the construction project prevents finger pointing later.

### Getting connected

The role of EVS in the design and construction process is complex. If nothing else, discussion of the process will cause EVS leaders to pause and reflect on their organizational relationships and how they may build them to become part of these crucial projects.

EVS leaders must get connected so they are invited into design and construction meetings. When listening to those reviewing the upcoming projects, EVS leaders should ask questions: Who's doing the final cleaning? When are the start and end dates? Who would be the contact for this project? Is there new equipment going in?

The EVS team has an essential role in infection prevention for both pre- and post-built environments. They have the invaluable knowledge, expertise and ability to keep newly built health care spaces clean and safe. **HFM**



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RESOURCE

Association for the Health Care Environment (AHE) members can access the Competency Model for Health Care Environmental Services Professionals resource by logging on to [ahe.org/evscompetencymodel](http://ahe.org/evscompetencymodel).





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## DATA

### Salary Survey

Complete survey results can be found online at [hfm magazine.com](http://hfm magazine.com)

# 22%

of Salary Survey respondents say they feel that their salary is much lower than peers in similar positions at different organizations.



Source: American Society for Health Care Engineering/Association for the Health Care Environment/Health Facilities Management 2021 Salary Survey

## ONLINE EXCLUSIVES



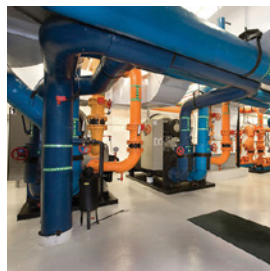
### SECURITY

**Preventing workplace violence**



### PROJECT MANAGEMENT

**COVID-19 and construction costs**



### MAINTENANCE

**Picking up on strange noises**

## SLIDESHOW



**Advancing care in its region**

The Center for Advanced Healthcare at Brownwood prioritizes patient experience.

## HFM ONLINE



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## TOP STORIES

- 1 Medical equipment maintenance
- 2 Oxygen tank storage regulations
- 3 Planning and maintaining isolation rooms
- 4 Best practices for deferred maintenance
- 5 Operating room cleaning procedures
- 6 Design distinctions for patient spaces
- 7 Cleaning and disinfection chemicals
- 8 Four criteria for selecting health care sites
- 9 FGI *Guidelines* updates for 2022
- 10 Louisiana hospital shares Hurricane Ida recovery

## E-NEWSLETTERS

*HFM* offers three e-newsletters:

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**PDC NEWS** // Monthly focuses on health care design and construction

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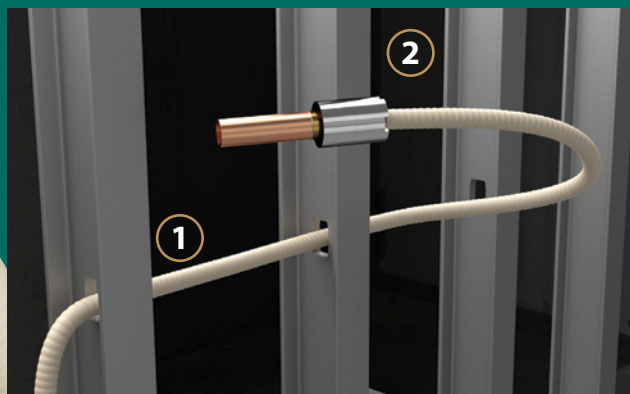
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